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THE FUTURE OF MOVIES, MUSIC, AND CHROME

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8 NEW CHASSIS REVIEWED!

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49 FREE APPS: EACH DOES ONE THING REALLY WELL

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AUGUST 2011

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Photography by Mark Madeo

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MAXIMUM PC

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George Jones

THE END, AGAIN

I'VE NEVER EVER RECEIVED as many emails in response to an editorial as I did to my June screed about AT&T ("High Speed Greed"). Our readers are typically quite eloquent when they agree (or disagree) with what we have to say on a month-to-month basis, but I was still surprised by your candor, verve, and level of insight.

I was also surprised at the happy-making series of events that this editorial set into motion. The short version is that one of our readers—Jim Setele from the Cleveland area—saw the story and, knowing someone fairly high up the chain at AT&T, alerted the company about my agony over losing my unlimited data plan. This person contacted AT&T's public relations agency, which was gracious enough to reach out to me, apologize, and offer to set things straight. Within one week of first contact, AT&T had restored my unlimited data plan. How great is that?

An even greater turn of events is that it looks like this series of incidents may actually help create some meaningful change in the way AT&T's call centers respond to customer requests about data plan changes. It sounds like AT&T is exploring ways to ensure that its customers are fully informed regarding data plan changes. So, from me to you to corporate America, we actually created some real change.

One of the great truths about *Maximum PC* is that we're extremely fortunate to have readers like you who are smart, understand technology at a deep level, and aren't afraid to intervene to help. (Or ask for help, which is often a more courageous act.) After working in the gaming journalism ranks for years, let me tell you: The exchanges I've had with many of you have been more intelligent by a factor of 10.

So it's with a simultaneously happy and heavy heart that I'm telling you this is my last issue at *Maximum PC*. Why? I'm going back into start-up mode with a new venture I hope will help the enterprise world make sense of all this emerging new technology.

I'm going to miss working with Gordon, Katherine, Nathan, Richard, Jon, Kate, Alex, Amber, Boni, and Alan. And I'm really going to miss hearing from you guys. Don't be a stranger—if you ever want to drop me a line, you can find me on Facebook or LinkedIn.

Take care,

↘ submit your questions to: comments@maximumpc.com

THE NEWS

Acer Chromebook

Google I/O: The Maturing of the Cloud

Google's annual tech fest brings new options and technologies for consumers and developers alike

AT ITS ANNUAL I/O EVENT, Google made its case for a fully cloud-based future more passionately and clearly than ever. The message resonated with the audience of mostly developers, who embraced Google's case with a fervor rarely seen outside of Apple events. Google also announced a number of products and initiatives, aimed at consumers and businesses alike. Here are the highlights.

Google Music

The biggest—and most controversial—announcement was Google Music, the company's cloud-based music delivery service. Google Music is a music storage and playback–only service. You upload the music you own to the cloud, and listen to it on your PC or Android device. You cannot redownload any music you've uploaded, and you can't buy music.

These seemingly severe limitations are how Google plans to avoid litigation with music publishers, though whether this will actually deter litigation is an open question. Google positions Google Music as storage only—much like Amazon.com's Cloud Player. Unlike Amazon, however, Google isn't a retailer of music. Amazon also allows users to redownload uploaded tracks. Google Music is currently live, as an invite-only beta, with an Android client available in the Android Marketplace.

And Movies, Too

Google also announced its YouTube movie rental service. You'll be able to rent mainstream movies from YouTube, including HD versions, for varying prices—typically $2.99, but current releases might cost $3.99 for a 24-hour rental. Like similar services, including Amazon, Hulu, and Netflix, Google doesn't offer all movies or TV shows, so you'll still need multiple subscriptions if you crave access to all movies and network shows.

Google Music, now entering beta, is Google's entry into cloud-based music storage—and it's strictly one-way.

Chrome

Google covered a number of features currently integrated into the Chrome browser, which the company believes will go mainstream over time. One fun preview was Angry Birds running on Chrome, primarily because of *how* it was running. Angry Birds for Chrome was built using WebGL, a hardware-accelerated version of OpenGL built specifically for web browsers. (Firefox 4 also supports WebGL, but not IE9.)

Google I/O offered several sessions on 3D graphics and gaming in the Chrome browser, some of which focused on taking better advantage of underlying GPU hardware. The era of crappy 3D in a browser will be drawing to a close. A fully rendered, fully interactive 3D racing car demo can be found at www.chromeexperiments.com/webgl.

Chromebook

Nothing illustrates Google's belief that the web is the OS of the future more than the Chromebook, which builds on last year's CR-48 developer laptop. Both Acer and Samsung are jumping into the fray, each with a slightly different spin on Chromebook; both are based on Intel's Atom CPU.

At the core of Chromebook is the Chrome browser, which will be the user's interface into the system. A Chromebook is an always-connected device that relies on Google apps and other cloud services for everyday computing. The Acer version, with an 11.6-inch LCD, will cost $350, while the Samsung Chromebook will run $500, including a slightly larger, 12.1-inch display.

But consumer pricing isn't that interesting. Google will be pushing Chromebook into corporate and educational accounts, charging $28 per month (business) or $20 per month (educational institutions) leases. Overall IT costs will be lower due to the simpler system management and migration whenever new hardware is introduced. It's a seductive pitch for IT departments struggling with budget cuts, but it's unclear whether Chromebooks will really have the horsepower needed for most users. **–Loyd Case**

More *Hurt Locker* Pirates Pursued

No, this isn't a rehashing of news from last year. Voltage Pictures, the maker of the Oscar-winning *The Hurt Locker*, has filed a new lawsuit targeting 20,000 more alleged BitTorrent users. The anonymous defendants are accused of pirating the film over the P2P protocol. This brings the total number of users sued by Voltage Pictures to 24,583.

The lawsuit seeks to force ISPs to reveal the personal details of the users behind all those IP addresses. It's worth noting that the judge on the case, Beryl Howell, is a former RIAA lobbyist. If Voltage gets the details on users, it will send out settlement offers. The goal is not to go to court, but to intimidate users into paying up.

Several ISPs have struck deals wherein they will work through a certain number of the subpoenas each month—Verizon, for instance, has agreed to do 100 per month. For some ISPs, it could take years to go through all of them. **–RW**

FCC Asked to Investigate Data Caps

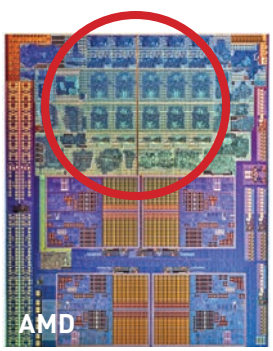
You're not alone if you think that AT&T's new bandwidth cap for broadband subscribers is suspicious. It strikes two Washington, D.C. tech policy groups as fishy, so much so that they're asking the FCC to investigate ISP caps in general. In their letter to the commission, the groups Public Knowledge and New America Foundation point out that Comcast, which implemented a 250GB cap years ago, hasn't bothered to increase the cap despite continued upgrades to its networks and healthy profits. That AT&T is issuing an even smaller cap at 150GB is further troubling, particularly since AT&T seeks to turn overages into a revenue source. Noting that 56 percent of all U.S. broadband subscribers are restricted by data caps, the groups warn that they "carry the omnipresent temptation [for ISPs] to act in anticompetitive and monopolistic ways." **–KS**

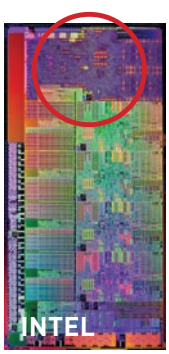
AMD's A-Series Targets Sandy Bridge

AMD's A-series chip will take on Intel's Sandy Bridge mobile chips in a spot they're most weak at: graphics.

AMD officials said the A-series of chips, previously code-named "Llano," will offer quad- and dual-core chips with far greater graphics performance than is available on any Sandy Bridge CPU. The A-series graphics will offer OpenCL support, a new Steady Vision feature to fix shaky Internet video in real time, and a Dual Graphics feature. Dual Graphics is really a more consumer-friendly name for the company's existing Hybrid CrossFire feature that lets you tie the onboard graphics to a discrete card.

The A-series is being fabbed on Global Foundries' new 32nm process, which AMD says will enable the chips to offer better life than its Sandy Bridge contemporaries. Officials admit that the Intel parts may be faster in pure x86 chores, but with future applications shifting to OpenCL (which Sandy Bridge lacks) and graphics performance becoming increasingly important, the A-series chips will be more than competitive. **–GU**





AMD's 32nm A-series chips put most of the real estate in graphics, while Intel's 32nm Sandy Bridge CPUs use the majority of the die for x86 cores. (Not to scale.)

Tom Halfhill **Fast Forward**

ANOTHER LEAP FOR INTEL

SUDDENLY, like a plunging guillotine blade, Intel has severed any hope that competitors will match its chip-fabrication technology for years to come. Last month I observed that the rest of the industry was gaining a little ground on Intel by adopting high-k metal-gate (HKMG) transistors—only four years after Intel's HKMG debut in 2007. But now comes Intel's next big leap: tri-gate transistors.

Commonly known as FinFETs (finned field-effect transistors), these devices are a radical departure from the planar transistors used in integrated circuits for 50 years. Intel calls them the first true 3D transistors, but that description and the term "tri-gate" are potentially confusing. This isn't 3D transistor stacking, which builds multiple layers of transistors on a chip. Nor does a tri-gate transistor have three electrical gates for controlling current flow.

Instead, a FinFET is a three-dimensional structure that rises vertically above the chip's flat silicon substrate. It looks like a tiny fin bisecting the gate structure. In contrast, planar transistors are flat devices etched into the substrate's surface.

FinFETs can handle higher drive currents and switch between their on and off states at lower voltages. Chip designers can use those characteristics to reach higher clock speeds, or use less power, or achieve some combination of those advantages. FinFETs also leak much less current when the transistor is switched off.

Intel now has a fundamentally superior transistor, in addition to its 18- to 24-month lead in lithography. While Intel is moving into 22nm production this year, competitors are lagging a generation behind, just starting 32nm or 28nm production. Some companies don't expect to have FinFETs until one process generation after Intel (14nm). Others have no FinFET roadmap at all. It adds up to a four-year lead for Intel—a huge obstacle for rival chipmakers to overcome.

Tom Halfhill was formerly a senior editor for *Byte* magazine and is now an analyst for *Microprocessor Report*.

Thomas McDonald
Game Theory

PORTAL AND THE THRILL OF DISCOVERY

THE ORIGINAL PORTAL was not a standalone game: That's important to remember. If it had been a movie, it would have been at the bottom of a triple bill, after Half-Life 2: Episode 2 and Team Fortress 2. It was a bonus.

But like some of the great B-movies, Portal rapidly eclipsed its A-list companions. This was something different. It was compact, flawlessly designed, witty, and unexpected. There wasn't an ounce of fat on it. Sure, it was a puzzle game, but in the process of ushering you gently through the puzzles it gradually transformed into a wickedly funny piece of sci-fi storytelling. The genius was in the thrill of this discovery, as a puzzle game flowered into something amazing and unpredictable.

And it can never happen again. Portal's appeal wasn't just in the mechanics or gameplay: It was in the gradual way GLaDOS went all HAL-9000 while you were busy playing with cubes. Portal 2 can't possibly duplicate that thrill of discovery, so it compensates with size and humor. It's a longer game, it's a funnier game, it's a bigger game. But is it a better game?

No. It's great, certainly, and has some of the best writing and puzzle design you'll find in any game this year. But the new bulk isn't muscle: It's flab. The environments get too large. The narrative sequences—so effortlessly blended into the gameplay of the original—now occasionally stop the game cold.

Yes, I know I'm nitpicking on a game that I'd gladly rate a 10, but my point is this: Bigger isn't always better, and some kinds of magic just can't be re-created. Portal 2 is many wonderful things, but it can never be the one thing that made Portal a classic: It could never be new again.

You can follow Thomas McDonald on Twitter at @StateOfPlayBlog.

Microsoft Unveils Windows Phone 7.1

Microsoft recently announced the first major upgrade to its Windows Phone 7 operating system. Code-named Mango and scheduled for release this fall, this 7.1 version incorporates more than 500 new features. Here are the key new features:

Improved Live Tiles: Mango will permit real-time information to be transmitted from apps to tiles.

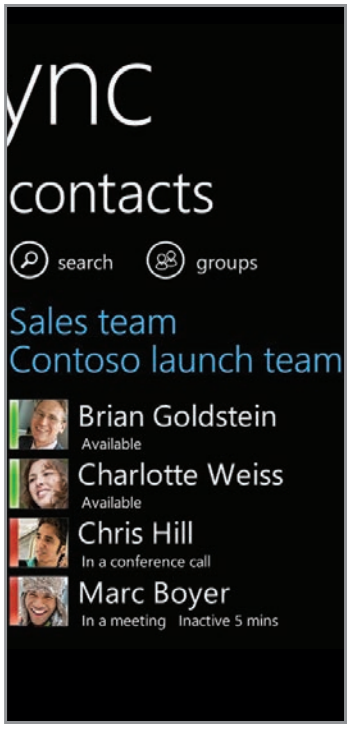
Threaded email and universal inboxes: You can still use separate inboxes if you prefer.

Multitasking: Finally! You can now jump from app to app by holding down the back button, which will bring up a screen of recent app tiles. It's not true multitasking because apps will be frozen in the background, but that's better for battery life.

App Connect: Allows app developers to integrate other apps and search results into their applications' functionality. The example Microsoft used is that if you searched for a movie, App Connect can connect the search results to Fandango.

Contact grouping: You can now set up groups such as co-workers, friends, and more, and you can create Live Tiles for these groups.

Internet Explorer 9 and HTML 5: Microsoft says it's exactly the same as the desktop version, including hardware acceleration. **–PL**



Windows Phone 7.1 lets you set up groups within your Contacts list.

Intel Scales Down Power Consumption

Intel says it has shaken up its mobile processor roadmap to make notebooks even more competitive with tablets. Most of Intel's notebook CPUs are designed to be 35-40 watts. Intel says future notebook CPUs from the company will be designed to be 10-20 watts.

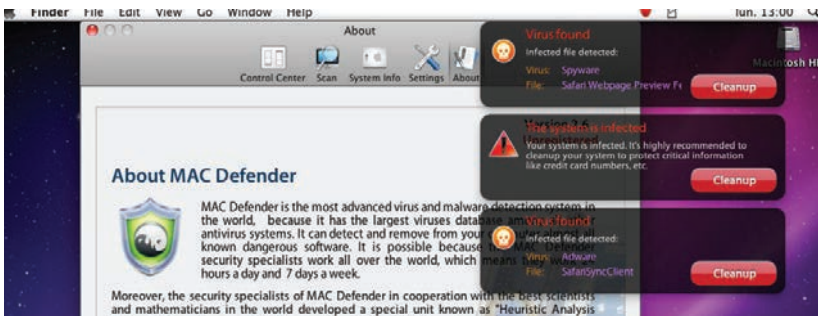
Intel says future Atom CPUs will scale down to milliwatts, which will allow them to compete in mobile phone and tablet devices. The announcement comes as the company faces continued pressure from ARM-based mobile phones, tablets, and other "post PC" devices, which pundits predict will put a serious dent in future PC sales. **–GU**

Malware Comes to the Mac

Mac fanboys have long insisted that OSX is immune to malware, but the specter of malware has finally come to the Macintosh.

The MACDefender trojan works by tricking users into installing a fake AV product, which then proceeds to find fake viruses and popup porn sites on infected machines. MACDefender then asks the user to buy the full version of MACDefender by entering a credit card number.

Within a day of widespread media coverage of MACDefender, an improved version was discovered by security software maker Intego that could be installed on a Mac without entering an administrator password. **–GU**



Quinn Norton
Byte Rights

WE CAN'T AFFORD NO EDUCATION

IN THEIR ONGOING QUEST to punch every puppy they can find, rights holders have turned to suing those most rapacious of pirates, professors. Academic publishers are asking a judge in Georgia for an injunction against Georgia State University for a liberal fair-use policy. What these publishers are objecting to is unapproved and unpaid-for book and article excerpts in class materials—essentially quoting and anthologizing. They want everything that can be paid for to be paid for. Specifically, professors couldn't use more than 10 percent or 1,000 words of an in-print book, whichever is less. That's about two pages. And it's campus wide—if I use two pages of Robert Jackall's *Moral Mazes* in my class, no student or teacher can use a third page without paying or getting sued by the publisher of *Moral Mazes*. See what's funny there? It's got "moral" right in the title. The publishers believe that anything in print isn't subject to fair use, a recently made up idea called the Market Failure Theory of fair use.

But that's not what fair use is about. It's a limit to copyright baked into the law. In the act itself, it cites a teacher making copies of classroom materials as a fair use. It's part of the copyright bargain; we grant these rights in exchange for material that improves our society as a whole, not so a group of publishers can get a piece of that mad college student money. These publishers not only want to make education more expensive, they want to make the university peer over the shoulders of teachers, making sure they don't copy that 1,001st word, or risk being sued. Hopefully, the court will rule against them, but even if it does, it's a sign of how publishers are treating the society that grants them their rights these days—badly.

Quinn Norton writes about copyright for Wired News and other publications.

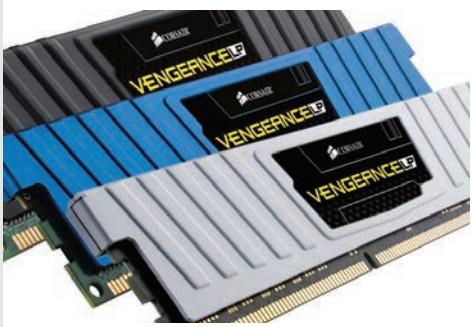
Nvidia Offers Wired 3D Specs for Less

Wearing a pair of 3D glasses is one thing, but would you be willing to keep yourself tethered to your PC? Nvidia is gambling that at least some of you will be fine with a wired set of specs, and so the graphics chip maker has announced a new addition to its 3D Vision product family, Nvidia 3D Vision wired glasses. Nvidia realizes that adding another wire to your desktop might be asking a lot, so these new glasses are priced at a buck shy of a C-note (MSRP). **–PL**

Microsoft Buys Skype

Microsoft shocked everyone in May when it suddenly announced an $8.5 billion buyout of Skype—the largest acquisition in Microsoft's history. The Redmond behemoth announced that the merger would enable Skype use on Microsoft platforms such as Xbox, Windows Live, and Windows Phone 7 devices, as well as integration with MS communications platforms such as Messenger, Outlook, and Xbox Live. It also announced continued non-Microsoft-platform support for Skype's 170 million users.

The deal marks the third acquisition of Skype since its 2003 founding, and Microsoft's umpteenth acquisition, at which the company has had varying levels of success. Microsoft can certainly use any edge it can get in the smartphone market; the Skype buyout could help its Windows Mobile Phone 7 platform compete with Apple's FaceTime. **–NE**



Corsair Launches Low-Profile RAM

Corsair has come up with a solution for anyone having trouble trying to squeeze a monstrous CPU cooling solution into their rig only to find that the RAM is getting in the way. It's the company's new Vengeance LP DDR3 memory series. These low-profile kits feature heat spreaders with a reduced height of 1.03 inches (25.25mm), nearly an inch shorter than the standard height of 1.87 inches (47.37mm).

The Vengeance LP kits are available in three different colors, including Jet Black, Cerulean Blue, and a Special Edition Arctic White. Like the original Vengeance series, these are designed to run at 1.5V, except for the Arctic White version, which operates at the ultra-low voltage of 1.35V.

To kick things off, Corsair plans to offer its Vengeance LP series in 4GB, 8GB, and 16GB kits, each one with a rated frequency of 1,600MHz and 9-9-9-24 latencies.

No word yet on price or availability. **–PL**

THE LIST

9 TECHNOLOGIES THAT NEED AN INSTANT UPGRADE

9 LANDLINES

Many landlines are built on ancient wiring, some only capable of data transmissions around 14Kb/s. There's a great opportunity to refresh the archaic network with fiber optic connections.

8 TELEVISION REMOTES

With today's Internet-connected TVs and the digital service cable providers use, we should be able to use smartphones and computers to control our TVs.

7 CAR RADIOS

What we could really get behind are Internet-based radios working off of mobile broadband services already blanketing most of the world.

HD Radio

6 CALCULATORS

There's a whole world of new functionality calculators can take on, like wireless connectivity, color displays, physics simulation, and gaming. Not to mention useful, educational applications.

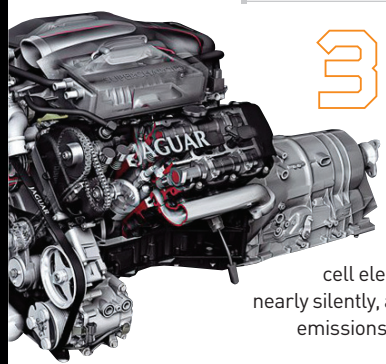
5 PRINTERS

It's time that printers got smarter. We're talking things like drivers (with no accompanying bloatware), smartphone connectivity, ability to access the print queue from any network-attached device, and affordable 3D printing.

LAPTOP COOLING

Most laptops put their cooling intake vents on the bottom of the chassis, where your lap blocks them. A better solution is to draw air down through the keyboard, à la Asus.

4



3 THE INTERNAL COMBUSTION ENGINE

It's time for a shift from the old to the new: a hydrogen fuel cell electric car. The car runs nearly silently, and has essentially no emissions (save for a bit of H20).

2 INTEGRATED VIDEO ACCELERATORS

Integrated GPUs have made some surprising performance leaps lately—particularly in the form of the new APUs from Intel and AMD. Great, but we want more. Is that greedy? Yes it is.

1 CURRENT-GEN GAMING CONSOLES

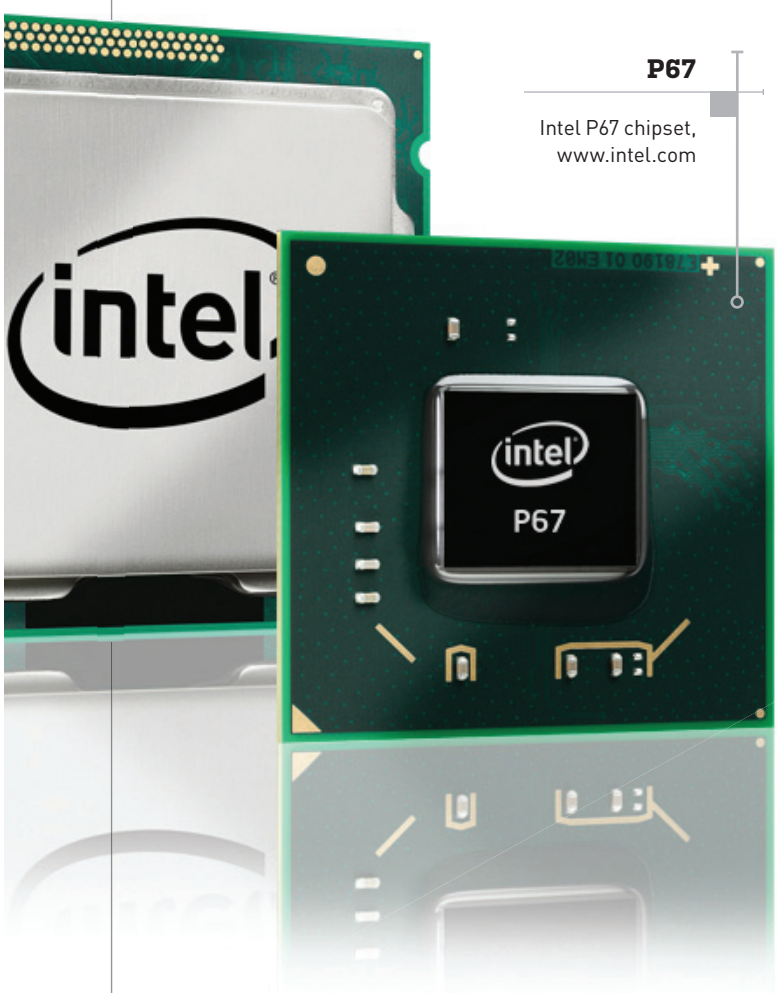
These 5-plus-year-old systems are leading to stagnation in the gaming industry. Epic Games has already produced a tech demo of its latest Unreal Engine 3, pushing hard for next-gen consoles to get here faster.

HEAD TO

BY GORDON MAH UNG

P67 vs. Z68

Should your new Sandy Bridge Core i7 be built on the classic, performance P67 chipset or Intel's new feature-rich Z68? To help you decide, we're pitting Intel's top LGA1155 chipsets against each other to see which is most worthy of your affection.



P67

Intel P67 chipset, www.intel.com

Round 1: Performance

We normally equate the concept of legacy with hardware, perhaps a floppy connector or parallel printer port. The truth is, the phrase "chipset performance" is rapidly becoming an outdated, legacy term. Why? The CPU is simply eating all those classic chipset duties that used to make a difference. For example, today's LGA1155 processor controls PCI-E and the memory controller. Today's "chipset" is nothing more than a fancy south-bridge chip. Thus, performance with a chipset is mostly about its native capabilities, such as its SATA 6Gb/s performance. Since both the P67 and Z68 use the exact same south bridge, now called the Peripheral Controller Hub, and the PCI-E and memory controller is in the CPU, performance is a wash. One fly in the ointment, though, is the Z68's Smart Response Technology (SRT), which greatly improves disk performance over a standard HDD setup on P67.

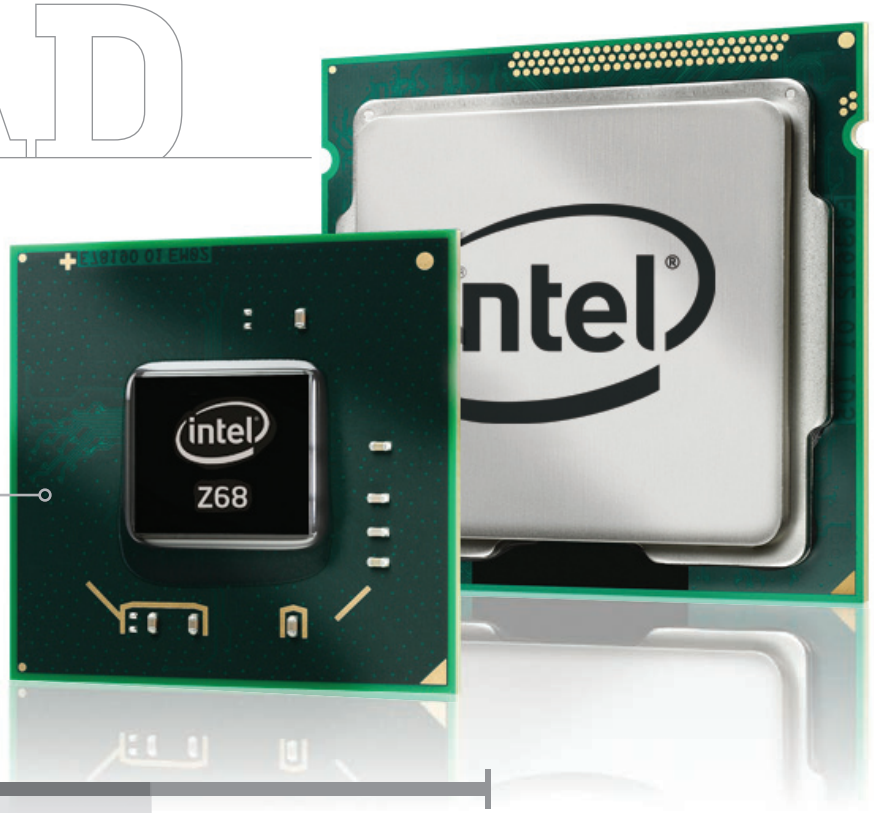
Winner: Z68

Round 2: Features

This one is a no-brainer. The Z68 is everything that the P67 is plus the very cool Smart Response Technology that lets you use an SSD to cache often-used data from your hard drive. This lets you use, say, a cheap and fast 20GB SSD to greatly increase the speed of your system over using just a hard drive. You can learn more about this great feature in our review of the Asus P8Z68-V Pro on page 82. The other feature the Z68 has over the P67 is the ability to finally access the built-in graphics processor in every Sandy Bridge CPU. The permutations of how it works are bewildering, but it's a handy feature to have. This round is an easy call.

Winner: Z68

HEAD



Z68

Intel Z68 chipset, www.intel.com

Round 3: Reliability

When we get questions from readers regarding Intel's P67 boards, the most common one seems to come from the movie *Marathon Man*: "Is it safe?"

What the readers want to know, of course, is whether it's safe to buy an LGA1155 Sandy Bridge board. After all, Intel did pull all of the P67 chipsets due to a bug that compromised the integrity of the SATA ports, at a cost of about a billion bucks. Those chips have since been replaced by the bug-free B3 versions, yet people still wonder.

Well, it's nearly impossible to get a non-B3 board, and if you do, the vendor will replace it. So stop asking, "Is it safe?" Oh look, another email: "Is it safe?" Sigh. OK. Never mind, we give up. Since the Z68 never had the issue, you should consider getting one of those instead.

Winner: Z68

Round 4: Availability

Features, performance, price—none of that means squat if you can't buy the frakking thing. We hit a popular online retailer and found 14 Z68 motherboards available. That's not bad, considering that the site didn't even include boards from the largest board maker, Asus, yet. On the P67 side, though, we found no fewer than 37 motherboards using the performance LGA1155 chipset. That's impressive, considering that we're still getting over the Great SATA Port Scare of aught-11. We'd be tempted to call this a tie since, by the time you read this, another dozen or so Z68 boards will be out, but P67 has been out the longest and is simply easier to find. The only caveat to P67 boards is that many of the original boards that were pulled and replaced still show up in inventories as not available. This makes it seem like there are fewer P67 boards than there are.

Winner: P67

Round 5: Price

It's a little tough to compare the P67 and Z68 on pricing alone, since there is no way to isolate just the chips. And consumers don't buy just the chips, they buy motherboards that have value-add software and hardware, like cool blinged-out heatsinks. Still, there is definitely a cost difference between the two. Motherboard vendors tell us this is primarily from two issues: a slightly higher price for the Z68 chip itself, and the cost of licensing LucidLogix's Virtu software, which lets you switch between discrete and integrated graphics. For example, Gigabyte's high-end Z68 board, the GA-Z68X-UD7-B3, is going for $350 on Newegg.com. The comparable P67 version, the GA-P67A-UD7-B3, is going for $315.

Winner: P67

And the Winner Is...

It's a close one, as P67 has the price advantage and greater availability. And, frankly, for a typical enthusiast setup, Z68 isn't an overwhelming feature fest. Still, we have to give this one to **Z68**. We think the switchable graphics option and the Smart Response Technology are compelling enough to make this the chipset to go with on a new LGA1155 system.

DOCTOR

THIS MONTH THE DOCTOR TACKLES...

Twice the Mice > Wireless Booting > Voltage Variations

Polishing a Turd

Can I use a solid-state drive on a Compaq Presario CQ60-615DX? If so, can I copy my drive data without any Windows 7 errors, and what's the best SSD for my PC?

–Alex Gudenau

THE DOCTOR RESPONDS:

Alex, you can use an SSD in your computer, but we question the practicality of doing so. Your computer cost around $600 when new, and has a 2.2GHz single-core processor, 2GB RAM, and integrated graphics. It's essentially a big netbook. Putting in an SSD will decrease boot and load times and cause your overall experience to feel fast, but you'd probably be better off with a cheaper RAM upgrade and saving the rest of your cash for a faster computer. Acronis's Migrate Easy (a free trial lasts for 15 days, www.acronis.com) is a quick way to clone your old Windows drive into an SSD, though an SSD of the same size as your current hard drive will cost almost as much as your computer did.

If you really want to get an SSD, however, you have two options. You can go for a budget SSD like the 40GB Intel X-25V, which will run about $100, and just drastically slim down the amount of stuff you keep on your computer. Or you can go for broke and grab a $500 250GB SSD, use it in your current machine, and then when you get a new machine, transfer the SSD to that.

Power on via Wireless Keyboard?

I want to be able to start up my computer from my wireless keyboard—a Logitech EX 100. I have a Gigabyte P67A-UD3-B3 motherboard. What's the cheapest way to do this?

–Craig Hendricks

THE DOCTOR RESPONDS:

The cheapest way for most users, electricity costs aside, is to enable Wake on USB in the motherboard's BIOS, and then put the computer into sleep mode when you're not using it, instead of shutting down completely. However, due to your particular motherboard, you actually have a better option.

Some Gigabyte boards, such as your P67A-UD3-B3, offer "Power on by Mouse" and "Power on by Keyboard" options, which actually let you boot the computer directly from either device, rather than just wake from sleep. To activate this feature, go into the BIOS and select Power Management Setup, then navigate to Power on by Keyboard. Change the value from Disabled to Password, than enter a password to boot from your keyboard. This one-to-five-character password prevents every accidental key press (or errant cat) from booting your computer, while still making sure you can boot intentionally when you need to.

Right Hand, Left Hand, Both Hands at Once!

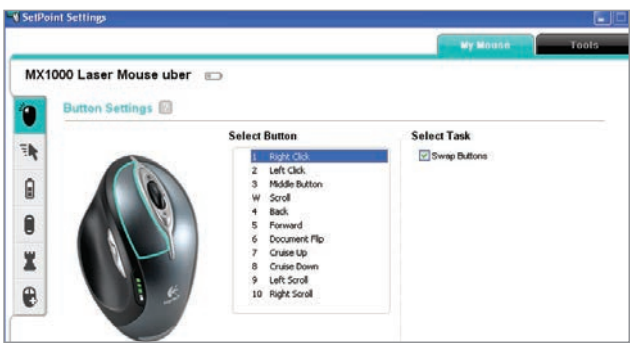
Is there any way to have two mice on the same computer with different settings? I use a left-handed setup at work (to the ire of the IT department) and want to start using a trackball-style mouse for CAD applications—but I have a right-handed trackball. I'd like to have the trackball set up on the right side, and the left-handed mouse set up on the left side, so I can swap back and forth as needed without changing any settings. Is this possible?

–Ben Locke

THE DOCTOR RESPONDS:

Ben, the first part is easy—just plug both mice into your computer and you'll be able to control the cursor and click with both. The tricky part comes when you want to give one mouse left-handed controls and the other right-handed controls. You can't do this with Windows' built-in mouse control panel, which assigns the same settings to all mice on your computer. But if your mouse has additional drivers (e.g., Logitech SetPoint), you very well might be able to do it.

We grabbed an old Logitech MX1000 wireless mouse and downloaded SetPoint 6.22.24. We weren't able to remap right- and left-click buttons, unfortu-



The uberOptions utility unlocks new configuration options on your Logitech mouse.

↘ submit your questions to: doctor@maximumpc.com

THE

BUILD A GAMING MACHINE THAT WILL SATISFY YOUR CRAVINGS WITHOUT BREAKING THE BANK!

$667 PC VALUE MEAL

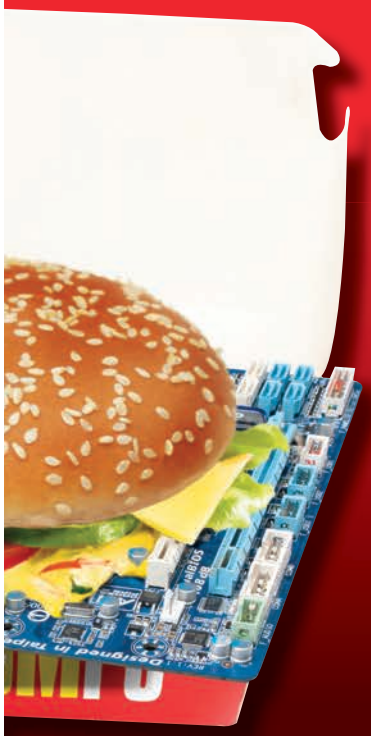
The thought of a gaming PC might conjure up images of decadent excess—a full-course meal of awesome that moves from an SSD consumé to a filet of Core i7 990X to quad-SLI under glass. While that's certainly a feast worth aspiring to, it's by no means the only fare that will give your gaming needs sustenance.

And, no, we're not suggesting that you ruin your health with an empty-calorie diet of console. In fact, unlike *some* corners of the gaming world, where there's a fixed menu of parts, the PC offers loads of options that scale from opulent to economical.

Our budget gaming rig is all about instant gratification: a way for you to fill your gaming hunger with a state of the art, speedy machine, capable of playing today's games at 1080p resolutions, for less than $700. With our instructions, you will see how you can build it yourself in less than hour. On top of that, we'll tell you how you can easily supersize your budget box with future upgrades.

Is your mouth watering? Let's dig in!

BY GORDON MAH UNG, HEAD FRY COOK



ON THE MENU

THE INGREDIENTS THAT MAKE UP OUR $667 PC

GPU: Sapphire Radeon HD 6790

$150

The selection of budget videocard these days is an embarrassment of riches. We've never seen such an assortment of truly powerful, low-cost cards. We decided on AMD's Radeon HD 6790, which is capable of 1080p gaming in such games as Crysis 2, Battlefield 2: Bad Company, and a ton of other premium titles. Is it a Radeon HD 6990 or GeForce GTX 590? No, our entire system was built for less than the price of AMD's or Nvidia's latest dual GPUs.
www.sapphiretech.com

CPU: Intel Core i3-2100

$126

Intel's Sandy Bridge chips are truly wondrous for being fast as hell and cheaper than, well, what Intel *could* charge. For example, the 3.1GHz Core i3-2100 dual-core is actually faster in most of the benchmarks—even those that are multithreaded—than the similarly priced Athlon II X4 quad-core, and even surpasses the Phenom II X4 965 Black Edition in many of our tests. Not bad for a $126 chip.
www.intel.com

Optical drive: Samsung SH-S222A

$22

A tech media prediction says that optical drives will go away within five years. Sure, maybe if you don't actually use a freaking computer for anything. Our budget doesn't allow for Blu-ray, so Samsung's trusty old 22x DVD burner gets put to work yet again.
www.samsung.com

Motherboard: Gigabyte GA-H67M-D2-B3

$90

We had to make tough choices to come in under budget and the Gigabyte board was one of them. That's not to say that it's a bad board, but there were some features that had to be sacrificed. First up, it's microATX, which limits future expansion possibilities. That doesn't hurt as much as the two DIMM slots, though. Ouch. If we had the extra cash, we would have ponied up an extra $30 to get a standard ATX board with four DIMM slots.
www.gigabyte.com

PSU: Rosewill RG530-S12 — $50

When push comes to shove, the PSU budget goes overboard first. That doesn't mean the Rosewill RG530-S12 is junk. Far from it, in fact. The PSU features two 6-pin GPU plugs and didn't hiccup once during our testing. It helps that the Rosewill PSU (the house brand for Newegg) was on instant rebate for $25. So, in many ways, it's actually a $75 PSU that we got for $50.

www.newegg.com

RAM: Patriot 4GB DDR3/1333 — $40

With the Patriot sticker on it, you know there's good support behind it. That's more than we can say for no-name generic RAM.

www.patriotmemory.com

Case: Rosewill R218 — $30

Believe it or not, we spent one-third more on this year's case than last year's. That's because Rosewill doesn't sell the $20 black metal case we used in last year's budget rig. But $30 for an enclosure is still pretty inexpensive, and the Rosewill R218 does the job.

www.newegg.com

Hard drive: Western Digital Caviar Blue 1TB — $60

With a $10 instant rebate, we snagged a massive 1TB of storage for $60. You can't really argue with that.

www.westerndigital.com

TODAY'S PARTS LIST SPECIALS

GPU:
SAPPHIRE RADEON HD 6790..... $150

CPU:
INTEL CORE I3-2100..... $126

OPTICAL DRIVE:
SAMSUNG SH-S222A..... $22

MOTHERBOARD:
GIGABYTE GA-H67M-D2-B3..... $90

PSU:
ROSEWILL RG530-S12..... $50

RAM:
PATRIOT 4GB DDR3/1333..... $40

CASE:
ROSEWILL R218..... $30

HARD DRIVE:
WESTERN DIGITAL CAVIAR BLUE 1TB..... $60

OS: OEM WINDOWS 7 HOME PREMIUM..... $99

TOTAL COST..... $667

OS: OEM Windows 7 Home Premium — $99

Is there any other choice?

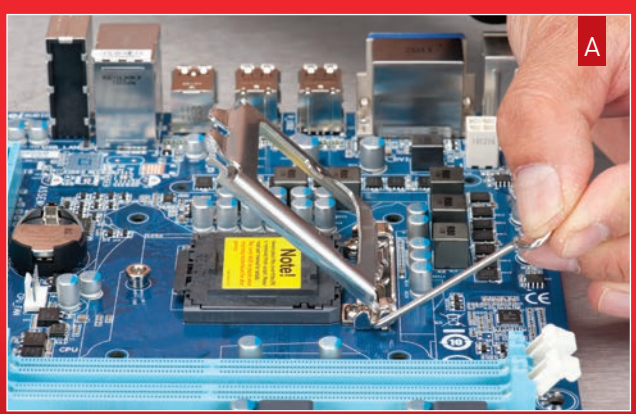
www.microsoft.com

1 PREPARE THE CASE

First, the Rosewill R218 case. Facing the front of the case, remove the left-hand panel by removing the two thumbscrews in back. The case features several built-in bump-type standoffs. You'll need to supplement these by installing additional standoffs in three spots (image A). To figure out where to place them, place your motherboard in the case and eyeball which holes in the motherboard do not have mounts under them. If you're a total newb, you should know that the four larger holes around the CPU socket are not for mounting the board: They are for mounting the CPU cooler. The standoffs you need should be in the sealed plastic parts bag that came with the case. Screw them in by hand and then use pliers to tighten them so they don't back out. This is also a good time to remove any expansion card slot covers. You need the top two slots for the graphics card in this case.

Next, remove the I/O shield, the rectangular metal plate that surrounds the PS/2, USB, and audio ports. Simply wiggle it back and forth until the metal tabs break loose. Your motherboard should have come with a metal I/O shield; fit this into the open hole. With our case, we had to remove the rear fan in order to fit it in (image B). After we installed the I/O shield (image C), we then reinstalled the fan.

A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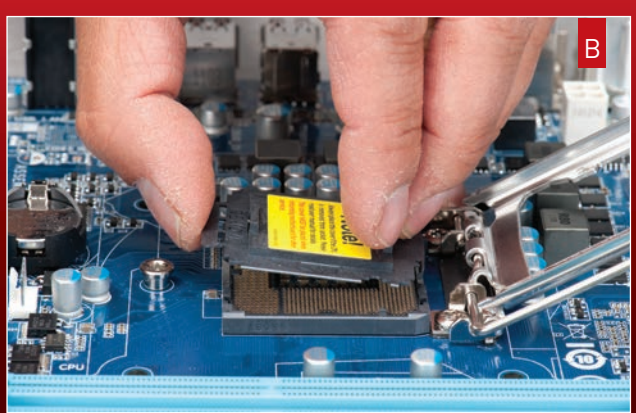
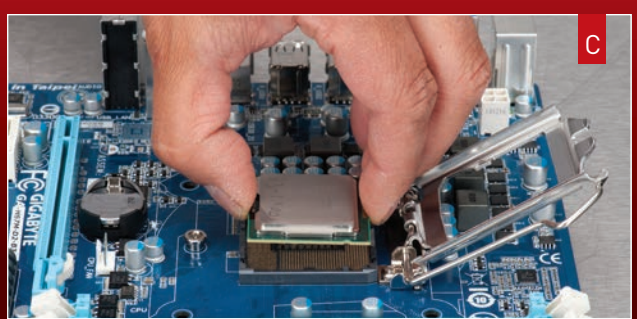

B

B

C

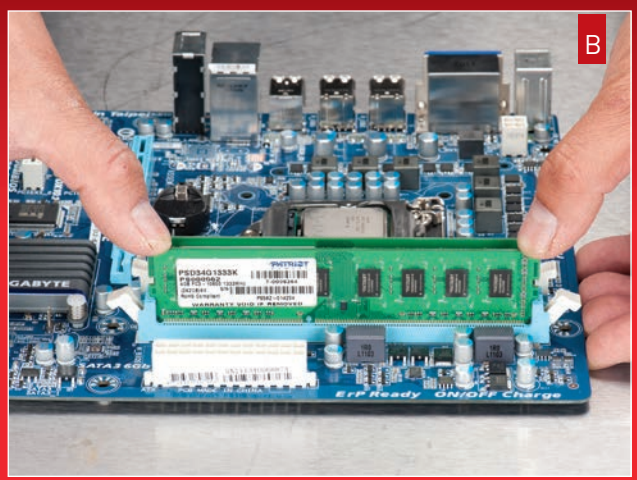
2 INSTALL THE CPU

Before you install the CPU, make sure to touch something grounded to remove static electricity built up on your body. If you're truly paranoid, use an antistatic strap. First unlock the socket's load plate by opening the little arm on the LGA1155 socket (image A). Now carefully pry the plastic protective cap from the socket (image B). Never touch these extremely delicate pins; bending them will kill the board. Keep the protective cap—you will need it in the event you have to return the board for warranty replacement. Now pick up your processor with two fingers and lower it as close as you can get to the socket. The two notches in the chip should match the two notches in the socket. Keep the chip parallel to the socket (image C). Do not drop one side of the chip into the socket and then drop in the other, nor slide it around in the socket, as it may damage the delicate pins. Once the chip is sitting flat in the socket (if it isn't, carefully pick up the chip and try lowering it in again), use the arm to lower the load plate and lock in the arm.


C

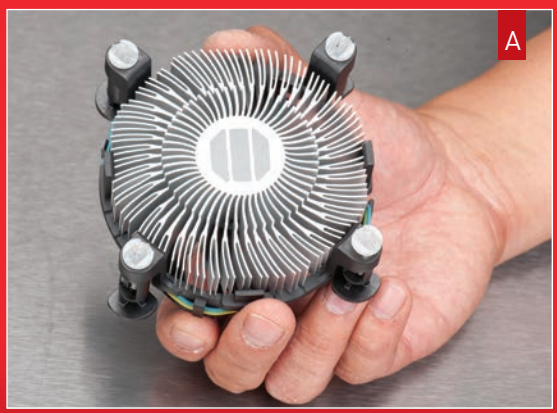
3 INSTALL THE RAM

Since the board is out in the open, let's take this opportunity to install the two sticks of RAM. You'll need to first spread open the two arms on each RAM slot. Now, match the notch in the memory stick with the notch in the slot. The DIMM is keyed so that it only fits one way (image A). With the DIMM perpendicular to the slot, push it straight into the slot until it clicks into place (image B). The arms should lock in place automatically; if the arms aren't totally locked in place, push them in with your fingers.



4 INSTALL THE HEATSINK

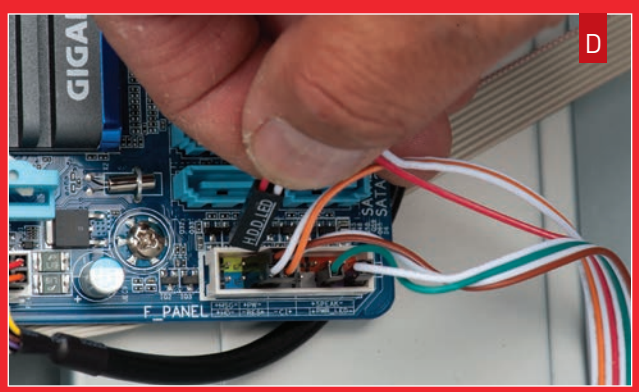
Our retail processor comes with the stock Intel heatsink fan that includes a thin film of thermal paste already on it (image A). For newbs: This paste helps fill in the nooks and crannies (yes, like a Thomas' English Muffin) that are formed when you compress the heatsink on the CPU. To install the heatsink fan, line up the four legs of the heatsink with the four holes around the CPU socket, and push the plastic anchor points through the holes by pushing on the knob-like top of each until you hear an audible click (image B). Using a criss-cross pattern, similar to how you would tighten down lug nuts, lock each of the four legs in place. Look at the bottom of the board and you should see the legs protruding through the bottom (image C). Also tug on the heatsink from the top to make sure it's locked in place. Now plug in the fan's power lead (image D).



5 MOUNT THE MOTHERBOARD

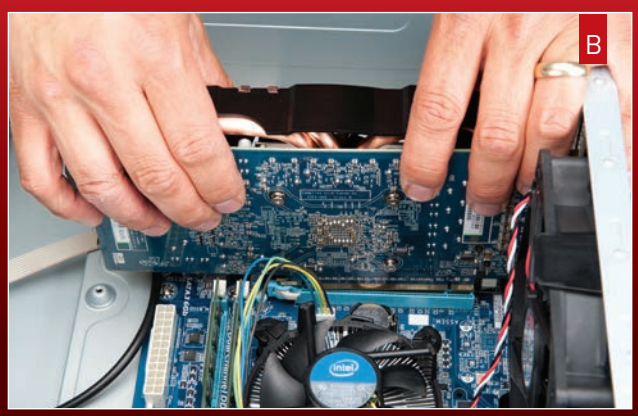
It's time to install the motherboard. Although our I/O shield is free of anything that can snag ports, it's very common for the little metal fingers to get stuck in the ports, so on your I/O shield, make sure that the fingers are not jamming into the ports when you install the board. Now, carefully lower the board into the case (image A). Use a Phillips-head screwdriver to screw the board in place (image B). Make sure the number of screws you use matches the number of mounting points in the case. In this case we have seven mounting points so we use seven screws. If you have seven mounting points but only use six screws, you have a mounting point in the wrong place. You should remove the motherboard and make sure that all of the mounting points line up with the motherboard's available holes. Use just enough force so the screws won't back out from vibrations, but not so much torque that it will damage the motherboard.

You're now ready to hook up the front-panel power, reset, and LED buttons, as well as the USB and audio connectors. To hook up the USB connectors, look on the board for the headers labeled USB and plug them in (image C). For audio, the header is labeled Audio. Hooking up the power, LED, and reset switches is also fairly straightforward but takes a little more work (image D). The power and reset switches don't have orientation requirements but the HDD and power LEDs do. Just so you know, the white wire usually indicates negative.



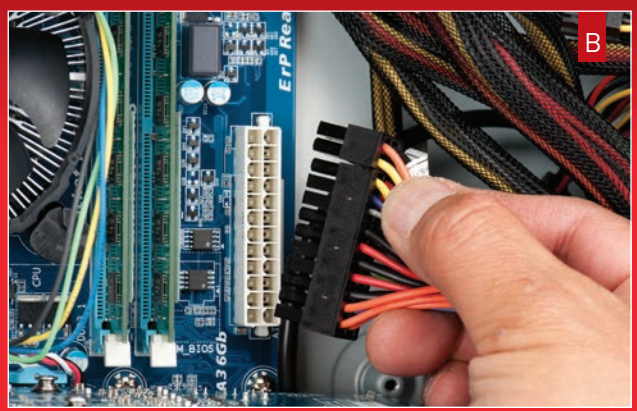
6 INSTALL THE VIDEOCARD

It's time to install the videocard. Before you can do that, you'll have to remove the wacky-ass card-retention device that Rosewill uses on its case (image A). Once the retention device is out of the way, install the card by slotting it into the top slot on the board (image B). The card should lock into place. If you have installed the card correctly, the gold connectors of the GPU should all be hidden by the x16 PCI-E slot. Reinstall the retention device, or use two standard machine screws to hold the card in place and toss the retention device in the trash.



7 INSTALL THE PSU

You're in the home stretch now. It's time to install the power supply. This is done by lowering the PSU into the case (image A) and using the four black screws that came with the PSU to secure it in place. Note, the fan on the PSU should face down in the case. If you somehow install it upside down with the fan facing up, the airflow into the power supply will be blocked by the case, causing the PSU to overheat and likely die. It's also time to connect the power cables to the motherboard and videocard. The larger connector is the main power connector. It's made up of a 20-pin and 4-pin plug. Push the two plugs together and insert them into the matching connector on the motherboard (image B). The plug is keyed so it will not fit in backwards. You should also take the pair of 4-pin plugs and plug one of them into the 4-pin connector that's just above the CPU socket. Plug the two 6-pin connectors into the GPU.



8 INSTALL DRIVES AND WINDOWS

The last step is to install the optical drive and the hard drive in the case. It's straightforward. To install the optical drive, gently pull the front bezel off of the case and remove the drive bay cover where you want the drive to go. Remember, the front-panel controls and lights are hooked up to the bezel by wires, so don't pull it out too far. Push the bezel back in place, slide in the optical drive (image A), and use two of the fine-threaded machine screws to lock it in place. This is usually enough, but if you're anal, you can install another pair on the right side by removing the side of the case. Next, slide the hard drive into the hard drive cage and use two of the coarse screws to lock it in place (image B).

Hook the SATA power cables to the optical and hard drives (image C). Using the two included SATA data cables, plug the drives in to the motherboard. The Intel PCH has six ports: two are SATA 6Gb/s (white) and four are SATA 3Gb/s (blue). Since both of our drives are SATA 3Gb/s, plug them into the blue ports (image D). Now plug the SATA data cables into the hard drive and optical drive.

The Gigabyte board defaults to IDE mode in the BIOS. We prefer AHCI mode these days to access the more advanced features of SATA 3.0, so we went into the BIOS (it's a BIOS interface with EFI) by hitting the Del key during boot and changed the mode to AHCI. While we were there, we also changed the boot order to hit the optical drive first.

Now, place your Windows 7 disc into the optical drive and turn the system on. If all goes well, the machine should boot and begin installing Windows 7.

DIGESTING THE BENCHMARK NUMBERS

APPRECIATING THE PC VALUE MEAL IS A MATTER OF PERSPECTIVE

We just got an email from Captain Obvious: A value meal from WacArnold's isn't quite the same experience as a meal at the French Laundry. It also won't set you back a month's pay. So, if you're expecting a machine that costs $667 to come close to machines whose cases alone cost almost that much, your expectations need to be drastically recalibrated.

We benchmarked our budget rig against our standard system benchmarks and all was as expected: an ass kicking. Our zero-point features an original "Bloomfield" Core i7-920 quad-core overclocked to 3.5GHz and a dual-GPU Radeon HD 5970 card. As fine a chip as the Sandy Bridge is, our 2100 is still just a dual-core, and thus has no chance against a quad. If we compare our budget build to a high-end gaming rig, such as the Maingear Shift Super Stock we reviewed in the July issue, the picture gets even bleaker.

But don't despair. Yes, the benchmark charts look ugly and horrible, but you have to have some perspective. For example, the videocard in our zero-point costs more than our entire machine, as does the Maingear's paint job. Our gaming benchmarks are also designed to stress maxed-out machines with gaming at 2560x1600 on a 30-inch panel (which itself can be three times the cost of our budget PC).

To see if the PC Value Meal actually had the chops to perform in less lofty circumstances, we dialed back the resolution to 1920x1080, the resolution that budget PC gamers typically run. (The latest Steam hardware survey shows 21.1 percent of gamers run this resolution, with 1680x1050 being a close second at 19.64 percent.)

We then fired up Crysis 2, Left 4 Dead, Portal 2, Total War: Shogan 2, and Battlefield: Bad Company. All of the games ran with more-than-acceptable frame rates in single-player and multiplayer modes. The upshot is that our PC Value Meal offers surprisingly satisfying gaming capabilities for most of today's games and leaves you enough money to, well, have a real meal to boot.

BENCHMARKS

PC VALUE MEAL PC VS. MAINGEAR SHIFT

	MAIN GEAR SHIFT	
VEGAS PRO 9 (SEC)	2,079	6,007 (-65%)
LIGHTROOM 2.6 (SEC)	261	435 (-40%)
PROSHOW 4 (SEC)	757	1,749 (-57%)
REFERENCE 1.6 (SEC)	1,451	3,840 (-62%)
STALKER: COP (FPS)	131.4	16.1 (-88%)
FAR CRY 2 (FPS)	217.0	49.6 (-77%)

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

The Main Gear Shift featured a 3.4GHz Core i7-2600K overclocked to 5GHz, 8GB of DDR/1866 on a Gigabyte P67 motherboard, two GeForce GTX 590 cards, two OCZ Vertex 3 SSDs in RAID 0, and Windows 7 in 64-bit.

PC VALUE MEAL VS. MPC ZERO-POINT PC

	ZERO POINT	
VEGAS PRO 9 (SEC)	3,049	6,007 (-49%)
LIGHTROOM 2.6 (SEC)	356	435 (-18%)
PROSHOW 4 (SEC)	1,112	1,749 (-36%)
REFERENCE 1.6 (SEC)	2,113	3,840 (-45%)
STALKER: COP (FPS)	42.0	16.1 (-62%)
FAR CRY 2 (FPS)	114.4	49.6 (-57%)

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Our current desktop test bed consists of a quad-core 2.66GHz Core i7-920 overclocked to 3.5GHz, 6GB of Corsair DDR3/1333 overclocked to 1,750MHz, on a Gigabyte X58 motherboard. We are running an ATI Radeon HD 5970 graphics card, a 160GB Intel X25-M SSD, and 64-bit Windows 7 Ultimate.

SUPER SIZE IT

What We Would Upgrade

We had to stick to a strict diet when spec'ing the PC Value Meal. We knew we wanted Intel's second-gen proc and a GPU capable of playing games at 1080p. Everything else was just a means to getting there as cheaply as possible. But what would we do if we had just a little more jingle to upgrade?

Honestly, our first upgrade would go toward the motherboard. A full-size board with four memory slots and a P-series chipset, such as the Gigabyte GA-P67A-UD3-B3 for $130, would be preferable.

The second item that could benefit from more money is the case. The $30 Rosewill is surprisingly solid for an ultra-budget case, but it's not one we think we'd keep long term. Of the items in your PC that will last the longest, the case is high on that list.

If we had the cash, we'd also think about upgrading the stars of the show: our graphics card and CPU. For just a few more dollars, the Radeon HD 6850 gets you up to the next rung on the performance ladder. And for just a few dollars more than that, the new GeForce GTX 560 (non Ti) is an attractive option. If you want a nice uptick in applications, the $185 Core i5-2300 gets you four cores at 2.8GHz, with Turbo Boost taking it to 3.1GHz.

The final upgrade for those concerned with long-term reliability would be the PSU. Normally we'd be apprehensive about an extremely low-cost PSU, but the Rosewill we're running is actually a $75 PSU, not a $50 unit, so we're fairly comfortable with it. Still, we'd ultimately like to step up to a 750-watt PSU; getting there means spending about $100.

THE USUAL SUSPECTS

BY NATHAN EDWARDS AND ALAN FACKLER

EIGHT NEW CHASSIS IN OUR LINEUP. EIGHT POTENTIAL HOMES FOR YOUR NEW RIG

WHEN YOU'RE OUTFITTING A NEW COMPUTER, IT CAN BE TEMPTING TO JUST BUY THE CHEAPEST NO-NAME CASE YOU CAN FIND, SLAP YOUR NEW PARTS INTO IT, AND CALL IT A DAY. While that might have been a valid choice in ye olde beige days—heck, early Dream Machine builds didn't even list the case—it's not one we'd recommend today. Enthusiast components today put out a lot of heat, and if that heat isn't dealt with, your rig's lifespan and performance will suffer.

That doesn't mean you have to spend an arm and a leg on your chassis, though you certainly can. This month, we round up eight cases, from budget to the extreme, to see how they measure up to the task of holding your precious modern components.

CM STORM ENFORCER

GOOD LOOKS, LOTS O' FEATURES, LOW PRICE

OUR INITIAL IMPRESSION of the Cooler Master Storm Enforcer wasn't great. Though the case is only $90, we can't help but feel wary running our hands over a lightweight plastic front panel. It's just instinct.

But after spending some time with the Enforcer, we actually came away impressed—mostly. The Enforcer comes with two USB 2.0 ports and two USB 3.0 ports—with an internal header, which is uncommon at this price point. Other welcome details: a removable dust filter, four toolless optical bays, six toolless hard drive bays, two 2.5-inch bays, seven standard PCI expansion slots plus an extra one suitable for a fan or light controller, and a large CPU-cooler backplane cutout.

The Enforcer looks a little bland until it powers up and the 20cm front fan lights up its red LED, which contrasts well with the case's black trim. The Enforcer also comes stock with a 12cm exhaust fan, and includes additional mounting holes up top. The inside of the chassis feels roomy enough, and you can remove the top hard drive cage to accommodate longer graphics cards. For $90 you get a solid mid-tower that's spacious and offers a broad range of cooling options, and looks good doing so. **–AF**

VERDICT **8**

CM Storm Enforcer

$90, www.cmstorm.com

BITFENIX SHINOBI WINDOW

A RARITY: INEXPENSIVE AND ALSO GOOD LOOKING

BITFENIX'S SHINOBI WINDOW manages to pack a whole lotta class into its miniscule frame. At 8.1 inches wide, 18.1 inches high, and 19.3 inches deep, the Shinobi Window is firmly in mid-tower territory. It's made of steel and is painted matte black inside and out, with BitFenix's smooth, rubberized SofTouch coating running up the front and top panel. The left-side panel includes a dark plastic window with a 12cm fan mount (fan sold separately) and the case comes with one filtered 12cm front fan (another is optional) and one 12cm rear exhaust fan. The top panel can hold two 12cm or 14cm fans (not included).

The Shinobi accommodates ATX, micro-ATX, and Mini-ITX mobos, and the tray has four cutouts for cable routing. It has seven PCI expansion slots and can take videocards up to 12.2 inches. It has three 5.25-inch bays, one of which includes an adapter for external 3.5- or internal 2.5-inch drive mounting.

The eight hard drive mounts are toolless. Due to the lack of stock fans and cramped inner quarters, the Shinobi's temperatures ran among the highest in our roundup in the thermal tests, but slapping a few more fans into it will improve that.

For $70, it's a classy-looking and surprisingly capacious case, and a hell of a deal. **–NE**

VERDICT **8**

BitFenix Shinobi Window

$70, www.bitfenix.com

SILVERSTONE RAVEN RV03

CAN WE SKIP THE GOLD TRIM NEXT YEAR?

SILVERSTONE'S LATEST RAVEN is the third in the series best known for its rotated-motherboard configuration, which puts the I/O backplane at the top of the chassis. The PSU mounts at the bottom-front of the case, and the entire mobo setup is cooled from below, using two upward-blowing 18cm fans.

The Raven tallies some impressive numbers: There's room for eight PCI slots, four 3.5-inch hard drive mounts, two 2.5-inch bays behind the motherboard tray, and eight 5.25-inch bays. The spacious interior can fit a 12.2-inch GPU with ease. Thanks to four cable-routing cutouts, a cleanly wired build is easy. And the two 18cm filtered intake fans gave the RV03 the best air-cooling temperatures of any case in our roundup, including the premium ones.

We're not sure how we feel about the RV03's exterior, though. Last year's Raven RV02 had a similar superhero-themed look, but was all black. This Raven has two gold stripes running up the front of the chassis, which strikes us as a bit tacky.

Overall, the Silverstone Raven RV03 is a solid case, and gets points for ingenuity. It may look a little garish and feel a little plasticky, but it's roomy, features a stunning amount of ports and slots, and offers a crazy-organized build and great cooling. **–AF**

VERDICT **9**

Silverstone Raven RV03

$140, www.silverstonetek.com

ANTEC SIX HUNDRED V2

LOOKS AND FEELS LIKE IT SHOULD COST LESS

THE ANTEC SIX HUNDRED V2 retails for $80. At that price, it's competing with BitFenix's Shinobi and CM's Storm Enforcer—and losing. The interior is unpainted and everything feels flimsy, from the just-pull-till-it-comes-loose optical drive bezels to the just-bend-till-it-snaps-off PCI slot covers, of which there are seven. Nothing, literally nothing, is toolless, either, so get that screwdriver handy.

The Six Hundred V2 comes with two fans: a 20cm top fan and a 12cm exhaust fan. The case has room for two front 12cm intakes. There is a window on the left-side panel, with a 12cm fan mounting, and also, curiously, a dark window above the optical drive bays so you can... well, look at your optical drive? These confusing cosmetic choices are all over the V2.

The Six Hundred V2 has room for six HDD and three ODD trays, and can accommodate GPUs up to 11.5 inches, so no dual-Radeon cards for you.

We were able to utilize the two cable-routing cutouts to tidy things up a bit. The front-loaded, hotswap 2.5-inch caddy is also kind of a cool addition. But ultimately, the cheap build quality, abundance of garish plastic trim, and lack of stock fans make this a hard sell. **–AF**

VERDICT 6

Antec Six Hundred V2

$80, www.antec.com

FRACTAL ARC MIDI

SUPER SIMPLE—AND THAT'S OK WITH US

THE FRACTAL ARC MIDI, part of Fractal's gaming-oriented Arc series, is a mid-tower steel chassis lined with mesh on the front and top panel. The surrounding front panel is made of matte plastic, though the plastic has a nice, brushed texture surface.

The Arc Midi has two standard USB 2.0 ports, a single USB 3.0 port (with an internal header), and standard power and audio jacks. Almost every aspect of the case, from the two optical drive bays to the hard drive cages to the seven PCI slots (plus one, for use with the included fan controller) is attached via thumbscrews. The Arc includes three fans: a 14cm front fan, a 14cm exhaust fan, and a 14cm top fan. Removing the top mesh panel (with removable dust filter) exposes two additional mounts for 12cm fans or a 240mm radiator.

Building into the Arc Midi is a cinch, thanks to plenty of room and three large, rubber-grommeted cutouts for cable organization, and two smaller cutouts in the top-left of the motherboard tray. Three 14cm fans rendered the Arc Midi's cooling performance among the best of the mid-towers we tested. This case might be simple, but simple can be good. **–AF**

VERDICT 8

Fractal Arc Midi

$110, www.fractal-design.com

Nathan Edwards

Senior Associate Editor

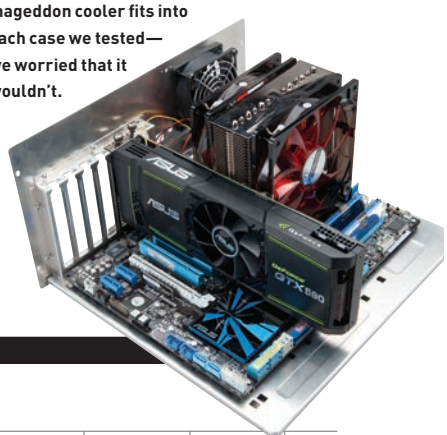
HOW WE PERFORM THERMAL TESTING

TO ENSURE USEFUL thermal test results, we have to use components that put out a lot of heat. Our case test system consists of a Core i5-750 CPU overclocked to 3.2GHz on an Asus P7P55D Premium motherboard, a dual-fan Prolimatech Armageddon cooler, and an Asus GTX 590—arguably the hottest GPU currently available. We use Intel's internal Lynnfield testing utility to stress all four CPU cores and loop Unigine's Heaven benchmark maxed out at 1920x1200 to put load on the GPU. Temperatures are measured with HWMonitor after an hour of activity, and then again after an hour of idling.

Our thermal test bed is designed to put out more heat than the majority of systems—the dual-GPU videocard expels air both fore and aft, and the overclocked processor would throttle on a less able cooler. We tested all cases with their stock complement of fans at their highest settings, so if your favorite case in our roundup has higher temperatures than you'd like, don't despair—a few judiciously placed extra fans and you'll be in business.

For details of our thermal test results, turn to page 45.

Big as it is, the Prolimatech Armageddon cooler fits into each case we tested—we worried that it wouldn't.



CORSAIR 650D

SLEEK, REFINED, BEAUTIFUL. STAY CLASSY, CORSAIR

Brushed aluminum makes just about anything look sleeker.

WE DON'T LIKE to make recommendations right off the bat—part of the fun of reading these reviews (we'd imagine) comes from the buildup (ha!). But the Corsair 650D blew us away in pretty much every category.

For the 650D, Corsair took the guts of its 600T mid-tower chassis and married them with the looks of its Obsidian-series full-towers, a move customers (and we) have been requesting for years. The steel chassis features a very pretty brushed-aluminum front panel with a removable mesh fan filter and a push-down rectangular panel giving you quick access to three USB 2.0 and two USB 3.0 ports, as well as the two standard audio jacks.

The chassis, which is painted matte black throughout, comes stock with one 20cm top fan, a 20cm front fan, and a 14cm exhaust fan—though you aren't confined to that particular fan setup, as there are mounting holes up top for two 12cm or 14cm fans, or a 240mm radiator if liquid-cooling is your cup of tea (or liquid nitro, whatever). Also up top: a sliding panel revealing a drop-down SATA dock.

The 650D, like its spiritual antecedents the 800D and 700D, seems to go out of its way to remind you that simple is better. The four optical drive bays and the six 3.5-inch drive trays are toolless, and both three-tray hard drive bays are removable. The plastic latching mechanisms within the cages threw us off a little at first, though we found them to be easy to use once we started building. The hard drive trays, in particular, had the perfect amount of flexibility without feeling cheap.

The eight rubber-grommeted cutouts make clean case wiring a snap.

Our test build with the 650D was an absolute breeze. The steel side panels pop right off using a set of latches, and we had no problem comfortably seating 12.2-inch GPUs. The eight available PCI expansion slots are the only slots in the case that aren't toolless. Cable routing was a snap, utilizing the 650D's eight rubber-grommeted cutouts, including a handy cutout in the top-left of the case for 8-pin ATX power connecter cables (case manufacturers take note: This is rapidly becoming commonplace). And worry not, you'll be able to ogle your highly organized innards thanks to a nice, big window on the left panel.

The motherboard tray, which supports ATX and microATX, is plenty big, and features a huge backplate cutout. Corsair's 650D is an elegant, refined, and extremely accessible case that is easy on the eyes and the wallet. For $200, you get a case that's technologically up to snuff, while being classy and sleek, to boot. The only things we could ask for are side intake fans—our test build got a little warm inside. –ALAN FACKLER

VERDICT 9 KICK ASS!

Corsair 650D

$200, www.corsair.com

THERMALTAKE LEVEL 10 GT

UGLIER, BUT BETTER THAN THE ORIGINAL

Like a skyscraper from a sci-fi flick, the Level 10 GT has a certain gaudy charm.

THERMALTAKE'S ORIGINAL Level 10 chassis was a remarkable collaboration with BMW DesignWorks in which the companies fundamentally restructured the PC chassis into a series of isolated compartments suspended from a central load-bearing wall. It was stunning, cost $800, and wasn't actually that practical to use. With the Level 10 GT, Thermaltake has taken the basic look of the Level 10, slapped it onto a more standard full-tower frame, and slashed $500 from the asking price. The end result isn't quite as sleek as its progenitor from an aesthetic perspective, but far outstrips the original in ease of use and practicality, and is not without a certain sci-fi flair of its own.

At 11.1 inches wide by 23 inches high and 23.2 inches deep, and weighing 28 pounds empty, the Level 10 GT is a hefty case. The case's frame and right-side panel are made of black-painted steel, and the right side has a ridge with a handle cribbed directly from the Level 10, although it's not part of the central pillar as on the Level 10. The front panel is made of plastic and contains four mesh 5.25-inch optical bezels and one 3.5-inch external-drive bay. The optical drive bays are toolless, with the latching mechanisms on the right side of the bays.

The left-side panel is where the action is. The rear two-thirds comprise a hinged-door panel that locks with a barrel lock, featuring a 20cm color-shifting fan (with directional shutters like a car's heating vents) on the bottom and a clear plastic window on top. The front third of the panel is devoted to drive trays: five slide-out plastic 3.5-inch trays (with 2.5-inch mounting holes, as well) mimic the solid-aluminum drive trays of the original Level 10, but feature hotswap SATA pass-throughs, prewired with a five-head SATA power cable.

Inside, the Level 10 GT is almost conventional, with plenty of routing options.

The 20cm color-shift intake fan on the side panel is matched by another on the front panel, as well as a 20cm color-shift top exhaust fan (which can be replaced by a 240mm radiator) and a 12cm rear exhaust fan. All intake fans, as well as the PSU intake, feature slide-out dust filters.

The Level 10 GT includes two USB 2.0 ports and audio jacks on the front of the right pillar, with two USB 3.0 ports, fan controls, and one eSATA port above the optical bays.

The Level 10 GT features a much easier install process than its predecessor—almost on par with the Corsair 800D. Its motherboard tray includes eight rubber-grommeted cable-routing cutouts, plus a large CPU backplane cutout. It has eight PCI expansion slots and supports ATX, microATX, and E-ATX motherboards. The motherboard compartment is sufficiently spacious to make installation of even the bulkiest systems a breeze, and the case easily accommodates 12.2-inch GPUs.

Thanks to its plethora of fans and capacious motherboard compartment, the Level 10 GT's thermal performance was the second-best of any case in this roundup, bested (only slightly) by the Silverstone TJ11, which retails at $600.

If you admired the original Level 10 but couldn't stomach its asking price or performance compromises, you'll find the Level 10 GT more to your liking. It's less sleek and, well, design-y, but in every other aspect it's the superior case. **–NATHAN EDWARDS**

VERDICT **9**

Thermaltake Level 10 GT

$280, thermaltakeusa.com

SILVERSTONE TEMJIN TJ11

THE LUXURY SPORTS CAR OF COMPUTER CHASSIS

At 2 feet, 1 inch tall, the Temjin TJ11 is a monster.

FROM THE MOMENT you first see it, it's clear that the Temjin TJ11 is Silverstone's balls-to-the-wall attempt to create the best chassis money can buy. Silverstone packs in virtually every trick in its arsenal—from the mid-chassis air-intake duct found in previous Temjin cases to the unibody aluminum frame of the Fortress FT02 to the rotated motherboard tray first seen in the Raven RV01. The result is massive, possibly over-engineered, and awesome.

At 9 inches wide by 25 inches high and 25 inches deep, the TJ11 is a full inch deeper and higher than the Corsair 800D, itself one of the largest chassis we've ever tested. Like all recent Silverstone cases, the motherboard is rotated 90 degrees, so the I/O plate and PCI slots point up. Unlike the Raven RV03, though, the motherboard tray is along the left-side panel, with the case window on the right panel. The TJ11 has a "dual unibody" frame—the front, bottom, and top panels are all a single piece of aluminum, with the rest of the case also made of aluminum, except for the removable motherboard tray and the mid-case fan brackets, which are steel. There isn't a rivet to be found on the case; it's all screws all the way, to the delight of any modder.

The TJ11 is separated into two main compartments. The lower compartment contains two three-bay hard drive cages. Each bay has its own 12cm fan, so the hard drives are thermally isolated from the rest of the case, and each HDD tray has its own hotswap backplate. The case can also accommodate two power supplies or one redundant server PSU.

The drive trays remove to accommodate a radiator up to 480mm. Between the bottom and top compartments are two mid-case air ducts that feed cool air to the two filtered 18cm intake fans at the bottom of the motherboard compartment.

We've chided Silverstone for taking few risks with its Temjin lineup. Never again.

The motherboard compartment is generously apportioned, with room for ATX, microATX, SSI CEB server boards, and even XL ATX boards like the Gigabyte G1.Assassin. The case has nine 5.25-inch drive bays—plenty of room for multiple water-cooling reservoirs, fan controllers, and more. Three optional SSD mounting brackets attach to the left side of the optical drive bays.

The I/O backplate contains nine PCI expansion slots and can accommodate quad-SLI or CrossFireX setups with the removal of a bracket. All the front-panel cables (two USB 3.0 via a pass-through, two USB 2.0, two audio cables, and two power buttons—one on top and one on the front) and connectors are routed to the bottom of the motherboard for easy cable management. Plenty of cable-routing cutouts mean that it's easy to construct a beautiful rig in the TJ11.

The case's two 18cm fans are quite loud at full bore, but the TJ11's thermal performance was the best of any case in our roundup. This is an all-around fantastic case, with superb performance, plenty of features, and beautiful attention to detail. It's obvious Silverstone has spared no expense in crafting the ultimate premium chassis. It's easy to spend more money on less case (see: Thermaltake Level 10, ABS Canyon 695), but it's also easy to spend less than half of the price on a case that's more than half as good, if you follow us. Nobody needs a $600 case. But if you're made of money and want to spend it on a great case, the TJ11 is our choice. **–NATHAN EDWARDS**

VERDICT
9
KICK ASS!

Silverstone Temjin TJ11

$600, www.silverstonetek.com

MAKING A POSITIVE ID

A PRIME SUSPECT EMERGES IN EACH PRICE CATEGORY

For a lineup like this one, which features cases of all shapes, sizes, and prices, there's no sense in declaring a single standout. How can a $70 budget mid-tower ever hope to compete with a $600 machined-aluminum behemoth, and vice versa? Thus, we evaluated each case on its own merits to see how it stacked up at its own price point and niche. With that in mind, here are our conclusions.

BUDGET BADASS

Four of the eight cases in our lineup are mid-tower cases between $70 and $110—enough for a mini-roundup of their own. But despite their similar sizes and prices, there's enough variety to distinguish each of them. The Fractal Arc Midi's less-is-more interior impressed us with its cooling prowess, ease of installation, and good looks. Both the CM Storm Enforcer and the Antec Six Hundred V2 offered decent cooling performance, as well, though, between the two, we much prefer the Cooler Master for its superior build quality. We liked the build quality and soft-touch exterior of the BitFenix Shinobi quite a bit, but its dearth of stock fans meant it ran hotter than the others. At $70, though, it's a good choice for less-demanding hardware.

MIDRANGE MASTER

The battle between our two midrange cases was tough. Corsair's 650D is everything we've come to expect from that company's cases—stylish, simple-looking, and a joy to build into. Yes, it was trounced in our thermal test by the Silverstone Raven RV03, which takes full advantage of Silverstone's rotated motherboard configuration and the ease of cooling that allows, but we still have to give the nod to Corsair. After all, it offers plenty of options for more fans.

THE KINGPIN

We'll close with our ultra-luxe cases. Both Thermaltake's Level 10 GT and Silverstone's TJ11 performed well in our thermal testing, though for their asking prices they'd better. Thermaltake's Level 10 GT isn't exactly the soul of minimalist design, but if that sort of chunky sci-fi motif is your thing, you'll appreciate its cooling prowess, ease of building, and Level 10 styling. Silverstone's TJ11, on the other hand, strikes a balance between restrained minimalism and extreme overengineering. If you need 30 pounds of aluminum that stand over 2 feet high, and you want a case that unquestionably looks and feels luxurious while having plenty of room for as many top-tier parts as you can fit into your shopping cart, and you have $600 to spend, you'll like the TJ11. It's overkill for the vast majority of people. But so's an Aston Martin.

> THE BATTLE BETWEEN OUR TWO MIDRANGE CASES WAS TOUGH.

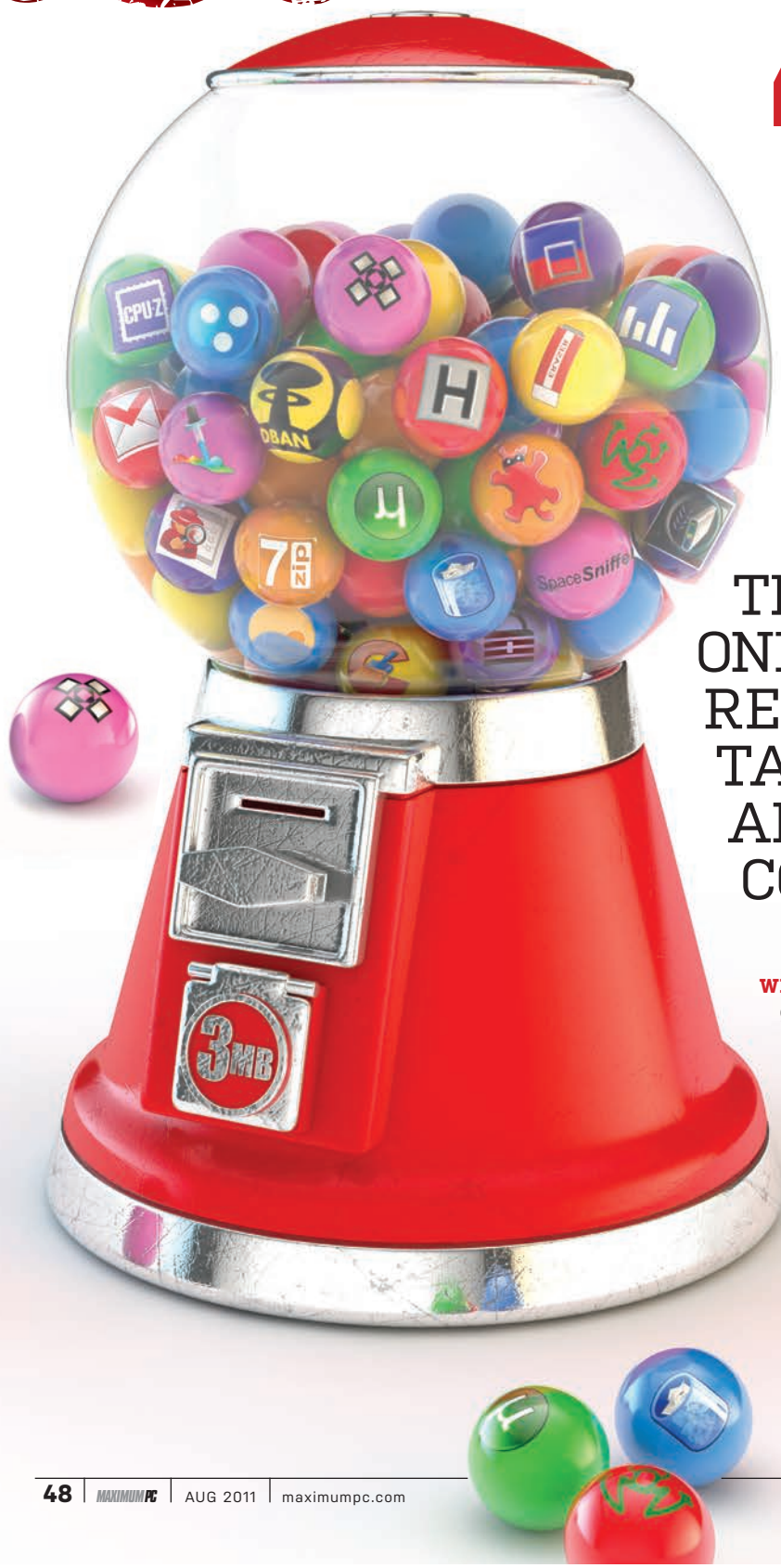
BENCHMARKS	CM STORM ENFORCER	BITFENIX SHINOBI	SILVERSTONE RV03	ANTEC SIX HUNDRED V2	FRACTAL ARC MIDI	CORSAIR 650D	THERMALTAKE LEVEL 10 GT	SILVERSTONE TEMJIN TJ11
CPU Burn (C)	60.5	64.25	56.75	60.25	58.25	62.75	55.75	**55**
CPU Idle (C)	35.25	36.5	**33.75**	35.75	34.25	37.25	34.75	35.25
GPU Burn (C)	84.5	85	**83.5**	85	85	85.5	84.5	84
GPU Idle (C)	**44.5**	50	46.5	46.5	49	50.5	48.5	47.5
System Burn (C)	63	67	**57**	62	62	65	59	59
System Idle (C)	35	36	**33**	36	34	37	34	35

Best scores are bolded. CPU temperatures are averages of four cores; GPU temperatures are averages of two cores. Our test bed consists of an Intel Core i5-750 overclocked to 3.2GHz on an Asus P7P55D Premium board with a two-fan Prolimatech Armageddon CPU cooler, GTX 590 dual-GPU videocard, 300GB Western Digital VelociRaptor hard drive, and 850W Thermaltake Toughpower PSU.

SMALL, SIMPLE & SWEET

49 LIL' APPS

THEY DO JUST ONE OR TWO THINGS REALLY WELL, TAKE UP HARDLY ANY SPACE, AND COST NOTHING



WHEN IT COMES TO COMPUTING, our general philosophy at *Maximum PC* is that bigger is better. More speed, more memory, more power—as far as hardware goes, there's no such thing as excess. Software, though... software's a little different. Big, feature-packed utilities and applications are great, but we prefer apps that show a little restraint.

That's why we've put together a list of 49 apps that kick ass without taking up a lot of space. Every program in this list can be downloaded for free, and is 3 MB or less in size.

BY THE MAXIMUM PC STAFF

Restoration

It's happened to us all. You delete a file, empty your recycle bin, and then later realize you want the file back. Restoration's sole purpose is to help you retrieve that data. No install is necessary. Just run the app, selecting to scan all deleted files or only those within select parameters. You can opt to recover files or select to wipe the files, making them unrecoverable to future attempts. bit.ly/jvNksk

f.lux

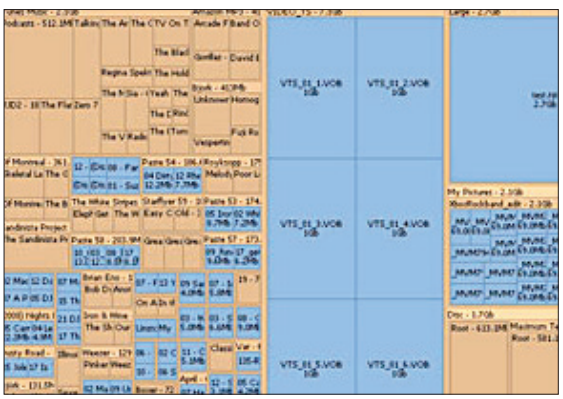
Ever notice that it's hard to sleep at night after staring at your computer screen all evening? It could be the color temperature of your monitor. F.lux is a simple app that matches the color temperature of your screen with the lights in your room, and with natural light in the morning. Go easier on your eyes; you only get one pair. Presumably. stereopsis.com/flux

Greenshot

If you take screenshots with any sort of frequency, you know that the standard screenshot functionality in Windows just doesn't cut it. Greenshot gives you a lot of flexibility in how shots are saved—whether they go to a folder, the clipboard, or straight to Photoshop. It also lets you choose exactly how you want to take shots. You can assign different hotkeys to take full-screen shots, custom-area shots, single-window shots, and more. getgreenshot.org

Volumouse

An essential utility for music fans, Volumouse gives you the ability to control the volume on your PC by rolling the wheel on your mouse. You define the rules for how the mouse wheel controls volume (when the Alt key is held down, when the left mouse button is pressed, etc). If those conditions aren't met, the mouse wheel reverts to regular scrolling tasks. www.nirsoft.net

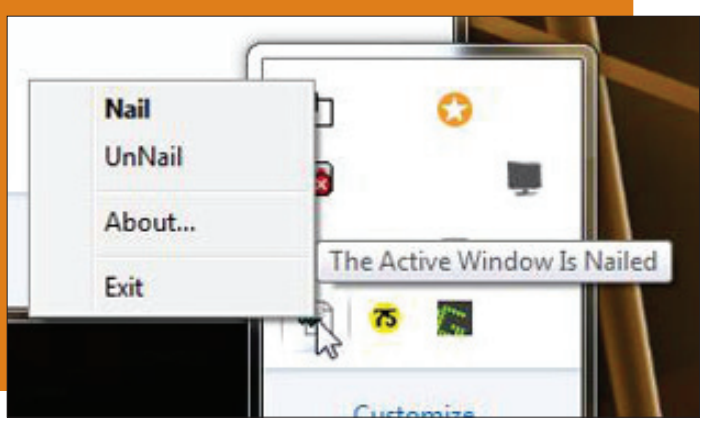


SpaceSniffer

What the heck is taking up all that space on your computer? SpaceSniffer scans your drive and creates a visual representation of all the stuff that's on it, so you can see at a glance what's cluttering your boot drive. From there you can right-click to interact directly with files and folders—delete, cut, copy, paste, etc. www.uderzo.it

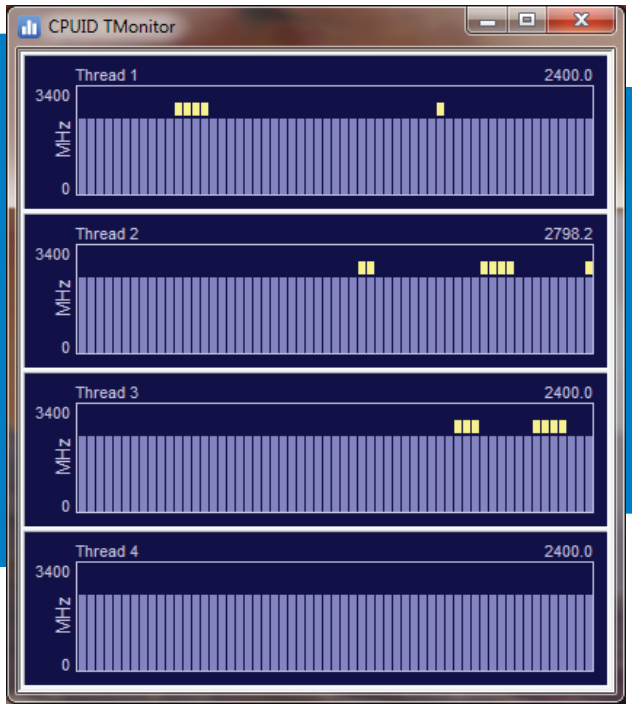
Nail It

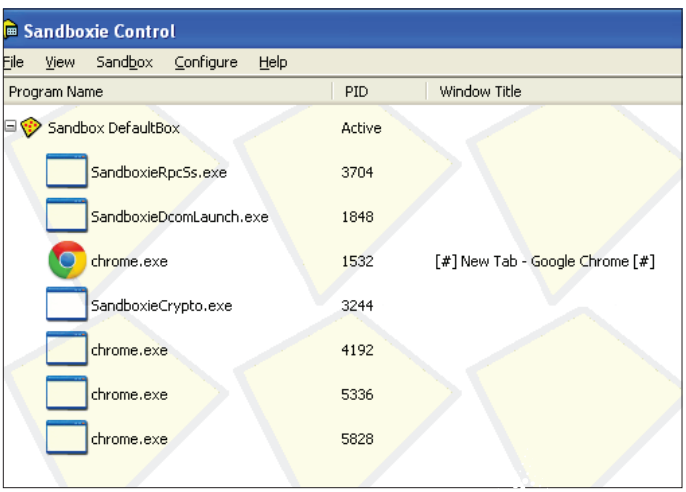
Nail It installs to your taskbar, and basically allows you to "nail" any given window in your OS. What does this mean? Well, if you nail a window, that window will stay on the top, no matter how many other windows you choose to open. If you're tired of your nailed window, you can unnail it, and assign the nail to a different window. bit.ly/kY2gx2



TMonitor

Fire up TMonitor, then load up your CPU with a good multithreaded workload such as Prime95. TMonitor should show all of the cores running at maximum clock speed, without any sags. Let it run for at least 15 minutes to an hour. If TMonitor shows large sags on some of the cores, your system has a thermal issue. www.cpuid.com





Sandboxie

Protect your PC and data from suspicious or malicious sources. The app provides a sandbox in which you can surf the web, run programs, and open questionable emails with abandon, knowing that all these activities are confined to an isolated space. www.sandboxie.com

Everything

Think Windows 7's built-in indexed search is fast enough? Think again. The Everything utility is an ultra-lightweight indexed search app that makes looking for files jaw-droppingly fast. Like, instantaneous. You can only search by file or folder name, but regular expressions are supported. www.voidtools.com

CPU-Z

CPU-Z has grown to be one of the most valuable tools an enthusiast can access. It gives you the nitty gritty on what clock speed your CPU is running at, what it idles at, as well as what stepping and revision it is. We often use CPU-Z to verify that our CPU is running at its rated speed. Believe it or not, sometimes a motherboard will incorrectly set the multiplier for a CPU and unintentionally underclock the chip. www.cpuid.com

Delayer

Delayer does what its name suggests, and allows you to create delays in launching Windows applications. It's handy for running sequences of programs, setting up your taskbar icons in a preferred order, and even creating pop-up reminder messages. www.cottonwoodsw.com

Eraser

Because we are constantly swapping out systems, drives, and components, this one's a no-brainer. Eraser is a highly secure data-removal tool. It's effective because it doesn't just delete your data, it completely nukes it all by overwriting it with patterns of data generated specifically to prevent future recovery. Best of all, it's free. eraser.heidi.ie

KeePass

We all know that we should be using multiple passwords for multiple accounts. But do you do it? No. Why not? Because it's impossible to remember all the passwords. KeePass is great because it handles this for you. A 256-bit encrypted database keeps all of your passwords locked down and accessible via Windows or even mobile devices. www.keepass.info

uTorrent

We like uTorrent because it's a lightweight (400K), fast, simple, and easy-to-use BitTorrent client that boasts many of the features in bigger clients such as BitComet. It supports UPnP, it automatically adjusts your bandwidth usage based on network activity, and you can customize the client via the uTorrent App Studio. And did we mention that it's fast? www.utorrent.com

CCleaner

We've been big fans of CCleaner (formerly Crap Cleaner) for many years. This application's main appeal is clearing cache and other temporary files to save space. It's well worth the install and it doesn't oversell itself as being able to rejuvenate your system like some clutter-clearing applications do. www.piriform.com

Secunia PSI

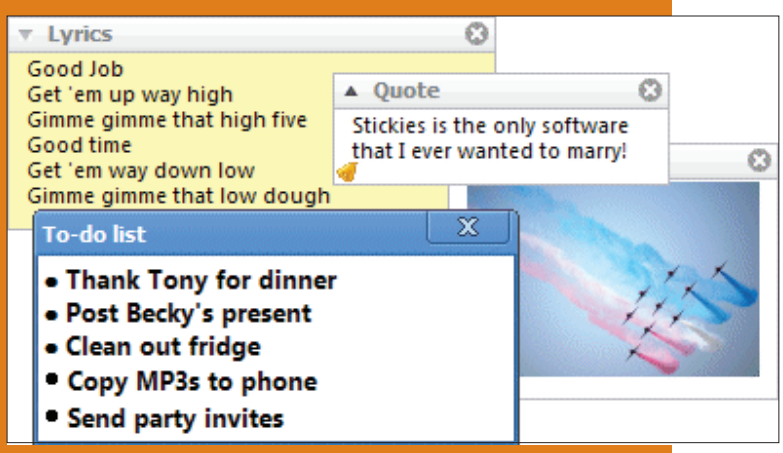
One of the most common ways for a PC to get infected with malware is through out-of-date, unpatched software. Secunia Personal Software Inspector (PSI) makes it its business to monitor all the software on your PC and inform you when a patch is available. www.secunia.com

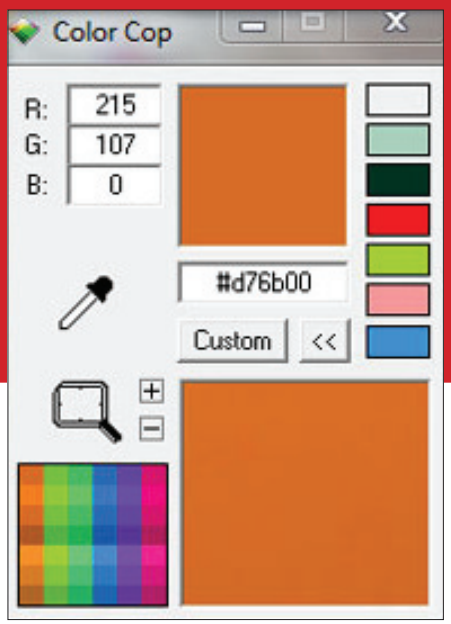
7-Zip

This is our default file archive package, partially because it's free, but mostly because it's powerful, flexible, and effective. 7-Zip unpacks all manner of archive formats, including .zip, .tar, .gz, and many others. The application even has its own file format—.7z—which is remarkably efficient at compressing files. It also supports 256-bit AES encryption, and can be configured to utilize multiple CPU cores. www.7-zip.org

Stickies

As handy as sticky notes are in real life, the same holds true on your PC. Stickies lets you affix digital sticky notes—small text-based .ini files—anywhere on a desktop, webpage, file, or folder, where they will stay until closed, even through reboots. There are options to customize your notes' font, color, format, size, and even the times at which they appear. www.zhornsoftware.co.uk





Color Cop

Color Cop is a multipurpose color picker that allows you to determine the color (and coding) of any color on any given selection. If you're trying to find the color of something particularly detailed, you can also use the magnifying tool to select individual pixels, ensuring that you find the color you're looking for. www.colorcop.net

SumatraPDF

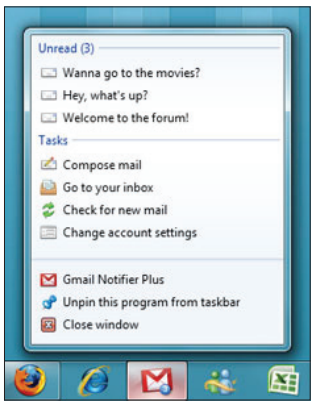
90 percent of the times you open a PDF, you just want to look at a PDF. You don't need attach-rate tracking, digital signing, password protection, DRM, an STMP server, or any of the massive security holes that seem to riddle Adobe Acrobat Reader. SumatraPDF is über-fast, responsive, and won't bog down your system. Also reads .xps, .cbr, and .cbz files. bit.ly/xsgdrt

EasyBCD

An award-winning utility, EasyBCD extends and takes control of the Windows Vista/Windows 7 BCD bootloader, allowing you to dual boot between Windows 7, Windows Vista, and older versions of Windows, as well as Linux, Ubuntu, BSD, and Mac OS X. bit.ly/2FpG4W

Prime95

If you think running your favorite game is a good stress test of your CPU, you're wrong. If you really want to squeeze your CPU hard, use Prime95. The app offers a menu of different stress tests for different subsystems. Your system should be able to finish any of the tests without any errors or crashing. If something bluescreens, your box likely has a thermal, power, or RAM issue. bit.ly/nwajer



Gmail Notifier

We'll keep this short and simple. Gmail Notifier displays an icon in your system tray whenever you receive new messages, revealing subject, sender, and a snippet of the message. bit.ly/vfdhgj

TeraCopy

Windows' file copying and moving can be a little arcane, and the interface lacks much useful information. TeraCopy is designed to copy and move files as fast as possible, with plenty of options not available in Windows Explorer, like pausing and resuming, error correction, and test copying. www.codesector.com

ResizeEnable

ResizeEnable is interesting in that there isn't even an interface to the program. Simply install the small file and suddenly you'll be able to resize nearly all windows on your desktop—including the ones that you couldn't prior. This helps consolidate all of your open windows without the need to minimize so often. bit.ly/safbew

Paint.net

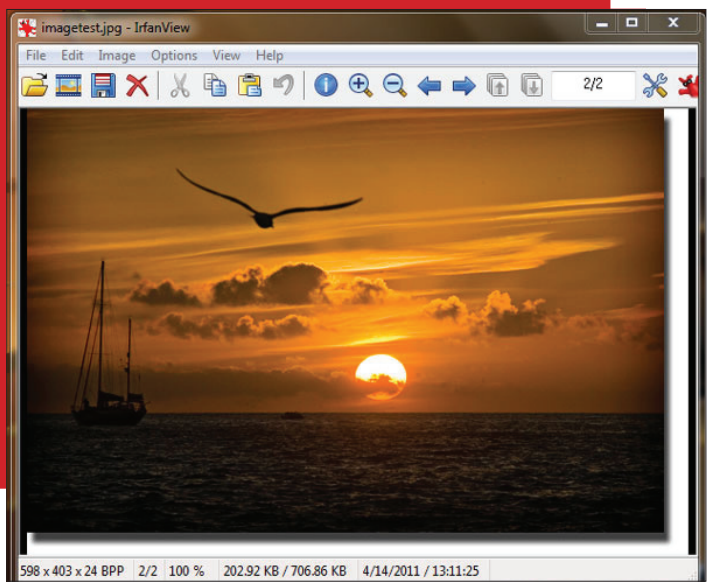
You don't need a shotgun to swat a fly. And you don't need an enormous and expensive image-editing program like Photoshop (or even a small, free, and complex program like GIMP) to do basic image editing. Featuring layers, robust edit history, and powerful tools, Paint.net is a great app that takes up almost no space. www.getpaint.net

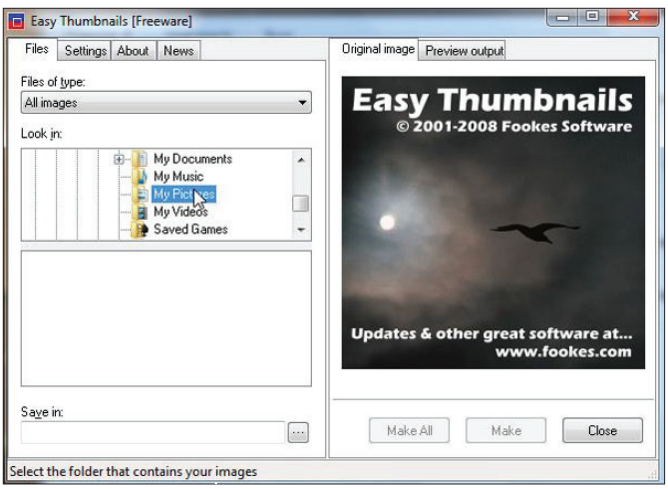
HWMonitor

Another of CPUID's gems, HWMonitor is like the tricorder of utilities. Want to know the maximum temp of core #2, or some other esoteric readout? HWMonitor probably has it listed. www.cpuid.com

IrfanView

IrfanView is a photo and video viewer that allows you to perform basic editing and color corrections. You can organize images or movies into slide shows, access the paint tool to draw over your image, and change the skins on your toolbar. You are also given access to a series of effects and filters to further alter your image. The real kicker, though, is that IrfanView supports a huge range of file formats. www.irfanview.com





Easy Thumbnails

Opening Easy Thumbnails puts you into a directory navigator, where you can select any local image you'd like to resize. For batch jobs it's a real time saver, as you can simply choose a series of images, pick a new size for them, and have a series of thumbnails ready to post wherever you'd like. Easy Thumbnails also saves original copies of your images, in case you're not happy with your resize. www.fookes.com

GPU-Z

If you want the full 411 on your graphics card, we know of no better app than GPU-Z. This tiny utility, which doesn't require installation, supports both Nvidia and AMD GPUs and provides a thorough accounting of a card's specs. We're talking clock speed, die size, ROPs, texture fillrate, release date, the works.
www.techpowerup.com/gpuz

HijackThis

Strange things happening to your PC? HijackThis, from Trend Micro, generates a full report of everything that's running on your computer. Helpful forum denizens (yes, such things exist!) can then help you parse your HijackThis log for anomalies, like spyware and malware. If you're feeling especially brave, you can use HijackThis to remove unwanted files yourself, but the software will helpfully remove anything you ask it to—including important things. So be careful.
free.antivirus.com/hijackthis

PC Decrapifier

If you're in the habit of buying new laptops (or off-the-shelf desktops), you're familiar with the stupendous array of bloatware that can ship with new computers. PC Decrapifier should be your first download on a new computer. Run it once and get rid of all the crap. And dream of a future in which software companies don't pay hardware companies to include crapware on new PCs.
www.pcdecrapifier.com

Memtest86+

The perfect utility for troubleshooting an ailing system, Memtest86+ is constantly updated to support new processors and chipsets. Simply download the prebuilt ISO from the website, burn it to a disc or create a bootable USB stick, plop it in the ailing PC, and boot to it. Memtest86+ will immediately begin running test patterns across the memory and flag any problems.
www.memtest.org

HashCalc

If you want to make absolutely sure that a file you download is bit-for-bit identical to the file you wanted, you should get a good hash calculator. Our favorite is HashCalc. www.slavasoft.com

DSClock

This is an awesome way to create a customized desktop clock. DS Clock 2.5 allows a remarkable array of configurations, including fonts, colors, transparencies, positions, and sounds. You can also choose to synchronize your desktop clock with atomic time servers, and integrate your Google Calendar into the clock as well. www.dualitysoft.com/dsclock

PowerMenu

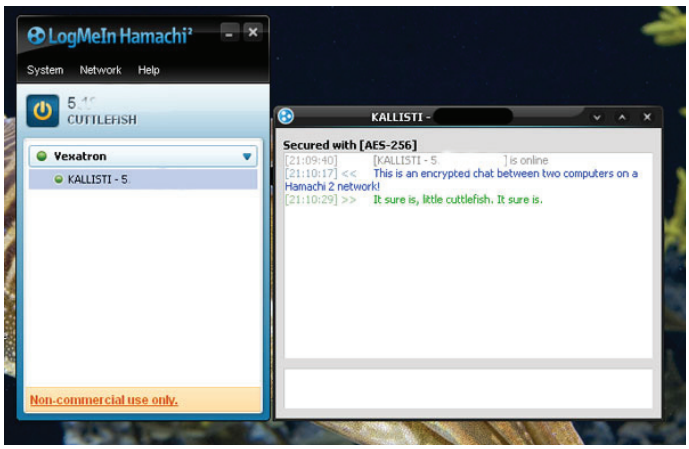
Ever since its debut back in 1998, PowerMenu has been a staple of our Windows environment. Once installed, it grants you additional right-click menu options such as the ability to make windows transparent, add system priorities to applications, and set a window to always remain on top. Pro tip for Win7 users: You have to hold down Shift + L to enable these options in the taskbar. www.abstractpath.com/powermenu

StrokeIt

If you're the kind of PC power user for whom even hotkeys aren't fast enough, you might want to think about mouse gestures. Without even having to reach for the keyboard, you can bind pretty much any action you can think of to StrokeIt's customizable mouse gestures. www.tcbmi.com/strokeit

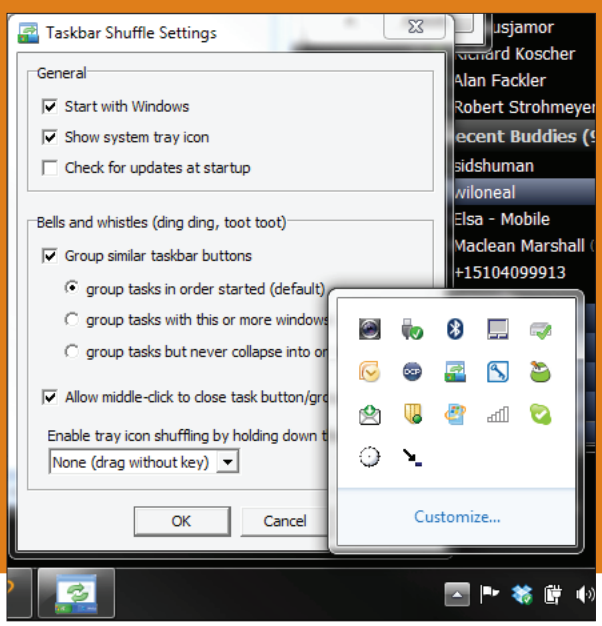
LogMeIn Hamachi2

LogMeIn Hamachi2 is an easy-to-configure utility that sets up a virtual private network (VPN) to let you securely access remote networks. Simple, secure, and free for noncommercial use, it's perfect for creating mock-LANs for LAN gaming at a distance, or for creating a virtual office network. Use in conjunction with UltraVPN to securely control your PC from anywhere. www.hamachi.cc



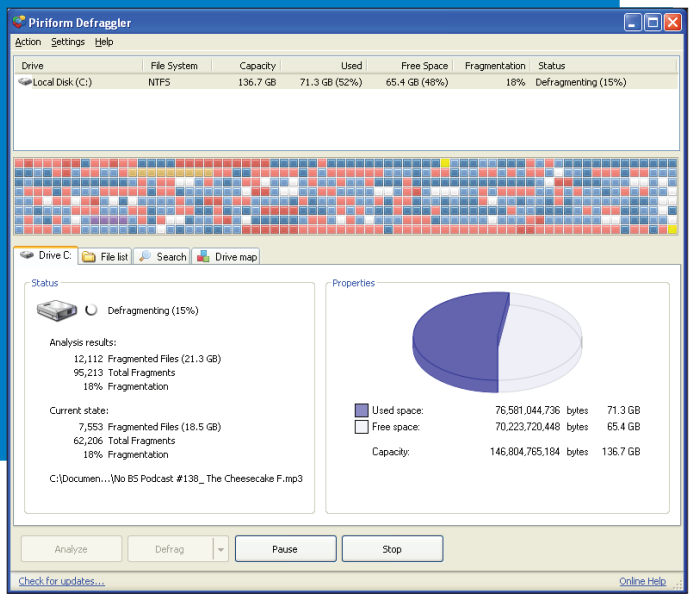
Taskbar Shuffle

Like the best wee apps, Taskbar Shuffle does a few things and it does them well. First, it allows you to quickly and easily rearrange and reorganize your Windows taskbar by simply dragging and dropping icons. Second, you can do the same to applications in Windows' system tray. Third, an options menu in the app allows you an even wider range of controls. It's also fully compatible with UltraMon. nerdcave.webs.com



Defraggler

One of Piriform's many fine utilities (others include Recuva, CCleaner, and Speccy), Defraggler does what it says on the tin: It defragments. You can use it to defragment an entire drive, or drill down and defragment individual folders and files. It's more useful for XP or older machines that lack the auto-defrag feature of Vista and Windows 7. And, of course, you shouldn't defragment an SSD.
www.piriform.com/defraggler



Revo Uninstaller

Ever get a pesky application that you just can't uninstall? RevoUninstaller is the equivalent of calling Chuck Bronson over to pull a Mr. Majestyk on it. Use the hunter mode, which lets you point the crosshairs at any icon. This lets you uninstall the app from the shortcut, kill its process, stop auto starting, or kill and delete the process. The free version is plenty full-featured to make it worth checking out.
www.revouninstaller.com

Folder Guide

Windows 7 has made it pretty easy to keep track of your most-used folders, with the inclusion of Libraries and the Favorites menu in Explorer. If you wish you could get those same, useful features in Windows XP and earlier, Folder guide is for you. Just select your favorite folders, and the app creates a custom context-menu entry that allows you to quickly jump anywhere you want in Explorer or the Save/Load dialogue box.
bit.ly/kTYMzu

AutoHotkey

Don't let the name fool you, AutoHotkey is good for much more than hotkeys. Designed for automating boring tasks, AutoHotkey's scripting language has been used to create any number of useful utilities for Windows.
www.autohotkey.com

VirtuaWin

Multiple desktops are a classic form of desktop organization but have never had native support in Windows. Of all the third-party solutions out there, VirtuWin stands out for several good reasons: It's open source, tiny, doesn't use many system resources, and it gives you all the functionality you need to manage programs across four virtual desktops.
virtuawin.sourceforge.net

CrystalDiskInfo 4

Let's face it, monitoring the S.M.A.R.T. values from your hard drive to head off the next hard drive crash is a bit like trying to predict earthquakes. Still, the research shows that this data can sometimes save your bacon. CrystalDiskInfo lets you constantly monitor your S.M.A.R.T. data as well as graph it.
www.crystalmark.info

Internet Traffic Report

Internet Traffic Report (ITR) loads into your toolbar, where its icon is the performance rating for the designated Internet path you choose to monitor—using the Configure tab, you can choose which region of the Internet you'd like to monitor, or switch monitoring between servers. Find and diagnose bandwidth issues, wherever you are. bit.ly/kK3WgR

Ultimate Windows Tweaker

What do you call an app that lets you change something about the Windows UI that you never knew was changeable? You call that a great tweak. What do you call an app that lets you make more than 130 tweaks for Windows Vista, 7, and Internet Explorer, all in a sub-500K package? You call that the Ultimate Windows Tweaker. bit.ly/mycgAJ

ShellMenuView + ShellExView

Alright, technically this is two apps, but they work together to serve a single purpose: taking back control of your context menu. For full instructions on using ShellMenuView and ShellExView, see our how-to article on MaximumPC.com (bit.ly/ynswrd). www.nirsoft.net

Startup Programs Tracker

Want to know what programs are automatically loading on startup? Startup Programs Tracker tells you, by scanning both the Start Menu and the system registry for such items. Then it automatically pastes results to the Windows Clipboard for easy sharing via email or other documents. SPT can also check for disabled startup items and changes to the default Shell value. bit.ly/k4tKDC

SMALL APPS, BIG FUN

10 games under 5MB

1 Desktop Dungeons

Reduces complex roguelike gameplay to small, puzzle-y chunks perfect for workday coffee breaks. www.qcfdesign.com

2 Nethack

A fantasy-themed dungeon crawl with almost-infinite replayability. www.nethack.org

3 Cave Story

Great gameplay, charming graphics, and tons of atmosphere, all in less than a megabyte. www.cavestory.org

4 Liero

A fast-paced, real-time take on Worms-style artillery combat. www.liero.be

5 N

A game of hair-pullling frustration and exhilarating near-misses. A great test for expert platformers. www.thewayoftheninja.org

6 Warning Forever

Another vertical shooter that chooses to do away with the schlubby minor baddies in favor of all boss fights, all the time. bit.ly/5gNKb8

7 Treasure Treasure: Fortress Forage

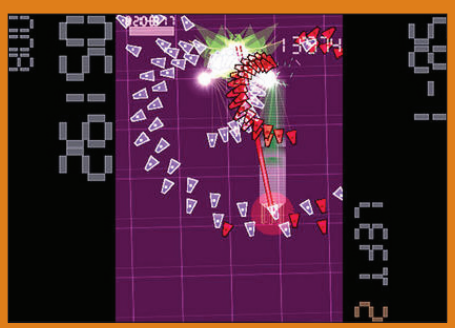
A tiny game for two. Co-op platforming action on a single computer. bit.ly/mH2dyU

8 Icy Tower

It may not be the first "jump up a tower" game, but it sure as heck beats Doodle Jump. bit.ly/MBdfH

9 DoomRL

Want to check out a roguelike, but high fantasy isn't your thing? Check out DoomRL, the roguelike based on Id's hit shooter. www.doom.chaosforge.org



10 rRootage

This abstract, "bullet hell"–style shooter features four unique game modes and hundreds of bosses to defeat. bit.ly/k24YfR

WHITE PA

BY BILL O'BRIEN

Microsoft Kinect

Microsoft's unique input device for the Xbox has opened up some very intriguing possibilities. But how exactly does it work?

Kinect is, perhaps, the most significant product Microsoft has developed since Windows itself. It has the potential to impact not only gaming, but general computing, communications, and media, as well. It's an evolutionary platform blending sight, sound, and software that, if developed correctly into the future, could become a revolutionary UI.

SIGHT

Kinect's console includes an RGB camera—the same type found in webcams and cell phones across the globe. Currently, it's a device with a 640x480 resolution capable of capturing 30 frames per second. It's not 3D.

An avatar, in this context, is simply a wireframe representation of the player that has been mapped with recognition points. These points correspond to the movement nexus that's available from the wireframe (wrists, neck, elbows, shoulders, hips, etc., in the case of human beings) and are what allow the system to emulate accurate player motion onscreen in real time. "Real," in this case, entails a reported 200ms lag—including screen response time—thanks to processing overhead and the usual screen refresh timing. It's possible to reduce this using a faster CPU, but in general, 200ms is right on the border of human perception.

This is basically the same motion-capture process that's been used for the last decade or so in, among other things, sports games, to accurately record athletes' movement for reproduction during the game's playback. But these professional systems use keyframes to flow the motion, while Kinect's approach bypasses the static recording of pre-existing motion, instead reproducing the kinetic motion presented by the live player (in 20 points of motion) as the action proceeds.

Perhaps more mundane but nonetheless important, the combination of infrared and RGB cameras also allows Kinect to provide facial recognition that can automatically log a player on to the Microsoft network as well as associate the player with a previously used avatar. A recent update, called Avatar Kinect, gives the console the power to recognize players' facial expressions and display them onscreen. In context, this ability can be used in several preconfigured venues (currently all thinly disguised chat room environments) to communicate with other players both verbally and through facial expressions. Apply notions of affective computing—which posits that systems will soon be capable of reacting to human facial expressions and emotions—and you can see why this is such a big deal.

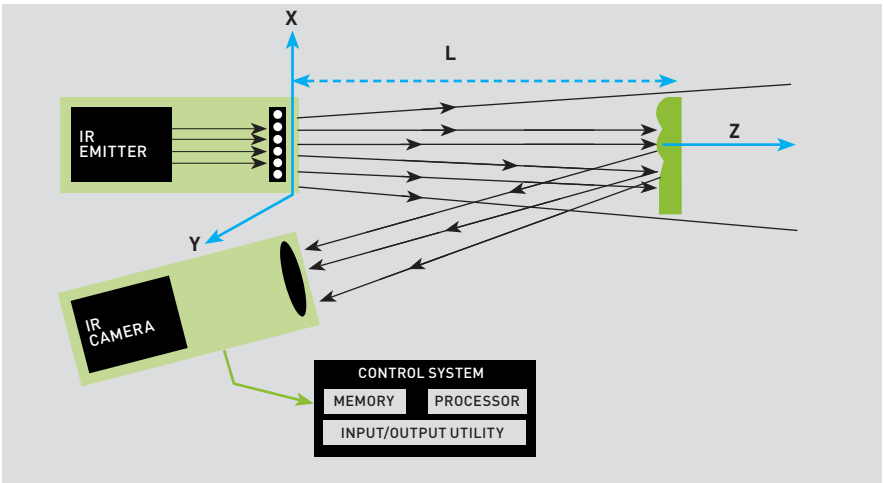
The entire Kinect console sits atop a pedestal, much like those of 1960s lava lamps. Unlike (most) lava lamps, the Kinect pedestal has a built-in tilt motor that lets the entire console move. The tilt range is about 27 degrees, and it's used in conjunction with the 57 degree horizontal field of view and 43 degree vertical field of the console's cameras to give the system a greater ability to track you as you move around.

SOUND

Although you may hear a barely perceptible whir coming from the console, it's the only sound you'll hear. There are no speakers inside the Kinect. Instead, the interior sports four microphones—three on the lower-right end, and a single on the lower-left side. All four face downward.

The quartet composes a spatial sound array that samples incoming audio and compares the four streams, separating background noise from speech, and different voices from each other. It's effective to about 4 meters from the console.

While noise-cancellation microphones have been around for years, Kinect faces the unique challenge of typically having TV/receiver speakers closer to the mics while the human voices are farther away. The acoustic-echo-cancellation techniques used



Nestled alongside the RGB camera are an infrared emitter and an infrared camera. The former bathes the immediate area in infrared while the latter collects the radiated and reflected information for spatial analysis. The Kinect combines the 2D RGB image with the IR background fill to complete a recognizable object that exists at a distance "L" from the system and is along the X, Y, and Z (3D) axes.

PER

in common speaker phones tend to work well, but the recognizable-voices-versus-background-noise scenario is the reverse of that for the Kinect. Software created by the Speech Group at Microsoft Redmond Research solved the problem.

SOFTWARE

The Kinect console does not have a processor, which is surprising considering all that's expected of it. The console did have one when it was first announced (Project Natal in 2009) but Microsoft withdrew the internal CPU and decided to let the processing power of the Xbox handle matters. Kudo Tsunoda, the mastermind behind Kinect, insists that the add-on uses "less than one percent" of the Xbox 360's processing power.

To help achieve that, Microsoft dropped the effectiveness of the camera down from the 60fps at its announcement in 2009 to 30fps at its commercial release. Still, that would put a huge burden on the software efficiency of the algorithms that run the console—except that the bulk of the overhead has been mitigated because the algorithms are located in the Xbox console as Kinect drivers.

These drivers are what describe a human's position in Cartesian space, and they are what handle reverberation problems and suppress loudspeaker echoes in the stereo acoustic-echo-cancellation algorithm. They do all this and more based on comparisons to decision forests (a collection of decision trees) in conjunction with thousands of stored samples.

CONTINUUM

There is no technical reason why a Kinect console could not be attached to any computing device that was loaded with the algorithms it needed to function. While that might be slightly difficult for the traditional BIOS/OS arrangement found in most contemporary computers, a UEFI environment would clear the way for the archetypal house of the future—run by voice commands and gestures with only its own facial recognition algorithms needed to provide security.

By the time you read this, it's likely that Microsoft will have made some form of Kinect-related announcement at the 2011 Electronic Entertainment Expo in Los Angeles. Early speculation is that Microsoft's purchase of Skype might herald advanced video conferencing—such as predefined avatars with full expressions instead of true video images, to keep the CPU overhead down. And somewhere in the far-out reaches of time and space, what might a Kinect for PC/Mac be able to do with an über CPU?

It's going to be an interesting future.

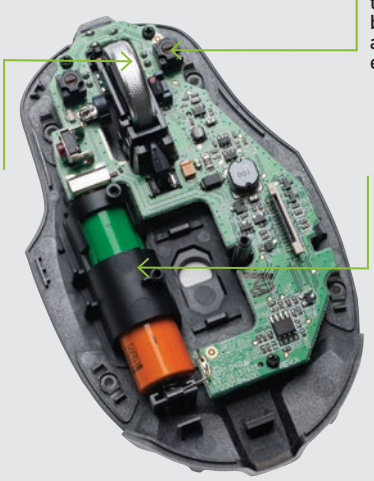
autopsy

MICROSOFT SIDEWINDER X8 GAMING MOUSE

It's not the newest mouse on the market, but the straightforward construction of the SideWinder X8 makes it easy to see exactly how a modern, high-precision gaming mouse works.

OPTICAL SENSOR A tiny camera watches the surface below the mouse, extrapolating the mouse's movement from the motion it records. On this mouse, a bright blue LED illuminates the surface to allow the camera to see; on a laser mouse, a laser diode would be used instead, for even greater sensitivity.

LCD DISPLAY A tiny backlit display provides information on the mouse's current sensitivity, in dpi (dots per inch).



SWITCHES Microswitches on the mouse's circuit board pick up the actuation of the external buttons.

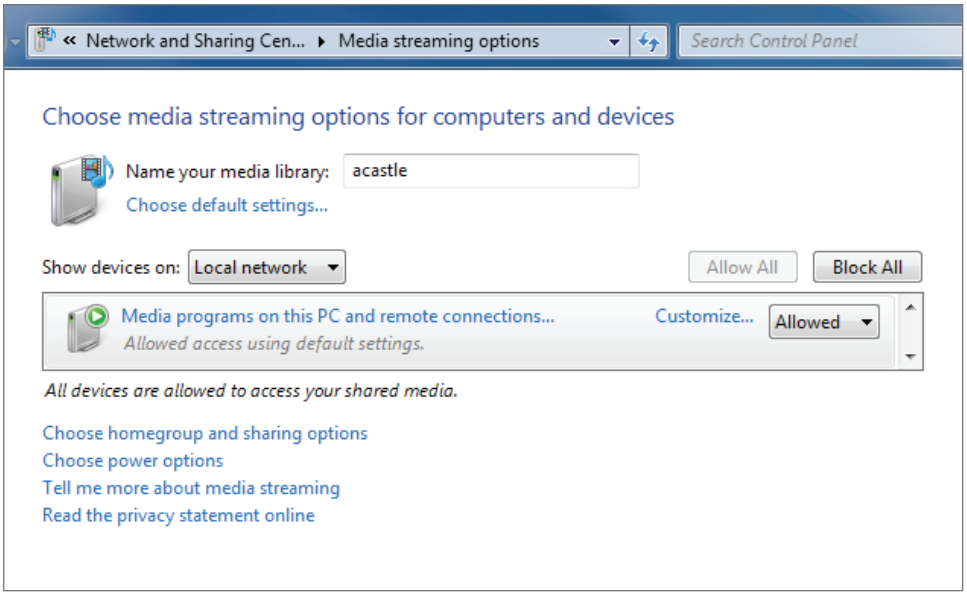
SCROLL WHEEL This scroll wheel's motion is tracked optically. Light from an LED on one side is picked up by a photoreceptor on the other. The wheel has a ring of tiny holes on its side, so that the light is broken repeatedly as the wheel turns, allowing the mouse to calculate how fast it's spinning.

BATTERY This hybrid wireless/wired mouse only draws power from its battery when the magnetic power and data cable is detached.

HOW TO

STEP-BY-STEP GUIDES TO IMPROVING YOUR PC

WINDOWS TIP OF THE MONTH



TURN ON MEDIA STREAMING

ONE OF THE MOST USEFUL FUNCTIONS OF THE WINDOWS 7 HOMEGROUP SYSTEM IS THE ABILITY TO SHARE MEDIA. HOWEVER, BY DEFAULT YOUR PC WON'T ALLOW OTHER COMPUTERS ON THE NETWORK TO ACCESS YOUR FILES. TO ENABLE THIS FEATURE, OPEN WINDOWS MEDIA PLAYER, CLICK THE STREAM MENU, AND CHOOSE TO ENABLE STREAMING.

MAKE - TWEAK - USE

62
Livestream Your Games to the Web

64
Track Your Stolen Laptop for Free

ALEX CASTLE
ONLINE MANAGING EDITOR

MORE WAYS TO SECURE YOUR HARDWARE

IN THIS MONTH'S HOW TO SECTION, I describe how you can use a bit of free software called Prey to track your laptop if it ever gets stolen. It's a great program, but it's not the only way you can strike back at hardware thieves. Here are three more programs that can be used to secure your laptop against theft. They're all free, and you might already have them on your system.

Logmein – Logmein is a great remote-control application on its own. As a bonus, if your computer gets stolen, you can log in to watch what the thief does.
www.logmein.com

TrueCrypt – This one won't help you snoop on a thief, but it can save your bacon. Use TrueCrypt's full-drive encryption to keep all your data protected from even the smartest thieves.
www.truecrypt.org

Dropbox – A final, extra-sneaky trick: Install a local, open-source keylogger on your own computer, and tell it to put its log file in your Dropbox folder.
www.dropbox.com

↘ submit your How To project idea to: comments@maximumpc.com

Livestream Your Games to the Web

How you can become the next online gaming sensation—for free!

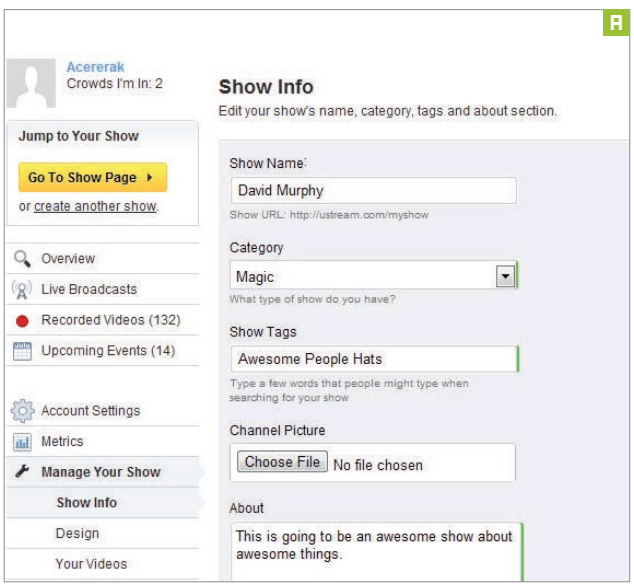
–David Murphy

SO YOU WANT TO be a video star? You'll have to work on your gaming skills first—you wouldn't want to disappoint your future legions of YouTube fans with a 0-64 record in StarCraft II.

Wait, what? Videogame streaming (and commentary) is a huge deal nowadays, and it's a lot easier to get in on the action than you might think. And don't forget bragging rights: Wouldn't you want to show all of your friends just how well you can wield a zergling? Or a portal gun? Or a desert bus adventure?

You don't need any flashy hardware or capture cards to stream your screen (and game) online. In fact, you can have your "I Rock at TIE Fighter" channel up and running within half an hour, at most.

Live streams of games like StarCraft II have become popular online entertainment.



1 SET UP USTREAM For livestreaming, we prefer Ustream (www.ustream.com), a free service that offers an effortless method for transforming a live recording of your desktop or laptop PC into an online broadcast. You don't have to worry about customizing a special player, or futzing around with hosting your feeds in some crazy way, or setting up your own server, or doing much beyond hitting the giant, obligatory Go Live button.

» For those who don't yet have an account, you'll start by hitting up the main Ustream site and going through the standard sign-up process. Once you're activated and logged in, click your account name in the upper-right corner of Ustream's homepage. On the following page, click the "Create a show" button in the upper-left corner **(image A)**.

» Voila. You're now in your new show's settings screen. Adjust your options to suit your preferences within the various tabs on the left side of the screen: Show Info, to manage the basics like name, category, and pictures; Design, to set up the look and feel of your streaming broadcast; and Settings, to change your broadcast's privacy and chat settings (among other options).

» Within the Settings window, make sure you click the Advanced Settings drop-down list at the bottom of your screen. Once you've done that, click the "Download the Flash Media Encoder XML file". This is your golden ticket to the online cinema, so make sure you remember where you saved it to on your hard drive. Very important stuff.

» And that's it! Don't start broadcasting your show just yet; we've only cracked the surface of what you have to do to get your new gaming stream up and running!

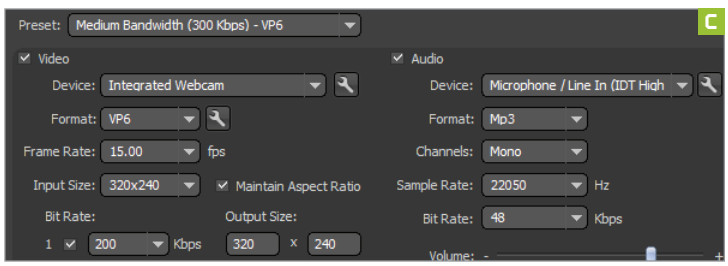
2 CAPTURE YOUR VIDEO You'll need a copy of the free VH Capture (www.hmelyoff.com) to begin. Unfortunately the official site is frequently down, so hit up Google and snag a copy from a download site that you trust. Install the app, then pull up the oddly named folder (Hmelyoff Labs) where it sits in your Start Menu, and click through to the subfolder of that (VHScrCap). Run the Config shortcut, which will pull up... a blank window.

» You'll want to click the "Create new one" button within the "VH Screen Capture Driver instance selection" window—we'll be establishing the parameters that the app uses to record your screen in the next few windows. If you're curious how this is all going to make it to Ustream, we'll later use a separate program to serve as the bridge between the "feed" created by VH Capture and the web service.

» After you've clicked the "Create new one" button, you'll want to select the Capture tab that appears on the subsequent VH Screen Capture Driver window. Click the Track Screen option. That's it! You might be tempted to fiddle around with the other settings in the misguided belief that you'll be able to specify exact portions of the screen that VH Screen

Capture will pull from. Don't bother; your settings won't matter, as we'll be cropping and dicing the recorded feed in a subsequent program.

» Click over to the Settings tab **(image B)**. Within this screen, you'll want to set your frame rate to a high number (try 60), as you'll want to have the highest-quality stream feeding over to the second program in our chain—that's where the compression will hit. Feel free to adjust settings for displaying the mouse or clicks as you see fit. Once you're done fiddling, make sure you leave this program open on its Options screen. We're on to Step 3.



3 BRIDGE THE GAP Grab Adobe's free Flash Media Live Encoder (adobe.ly/NQWU), install it, and fire up the application. When it loads, you'll want to start by clicking the File menu, then Open Profile, and then selecting the Flash Media Encoder XML file you previously downloaded from Ustream.

» You'll then want to find the Video section within the Flash Media Live Encoder's configuration screen **(image C)**. Click the drop-down list next to the Device entry and select VH Screen Capture, or VHScrCap, as the device that Adobe Flash Media Encoder pulls from. If everything is going to plan, a vision of your desktop should pop up in the preview window above the app's configuration options.

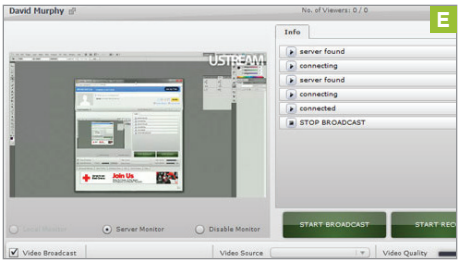
» Select the ever-awesome H.264 codec as your encoding format, and then click the tiny wrench icon to the right of the selection box for Advanced Encoder Settings **(image D)**. StarCraft II recording veterans tend to adopt profiles that use more keyframes—a one- or two-second keyframe. That's because a keyframe is a recording of the screen as it looks at a particular time; anything up until the next keyframe is rendered as a differential adjustment to the underlying static keyframe image. Or, to put it another way, you'll have less blur and incorrect coloration if you set keyframes to a faster (lower) interval. Also, change your profile from Baseline to Main.

» If you're planning to stream a windowed game for whatever reason, now's the time to set your input size and cropping options. This part of the setup is pretty self-explanatory: Input size allows you to isolate the particular portion of your original stream that Flash Media Live Encoder should use, and the cropping options allow you to drill down to a pixel-perfect rendition of whatever dimensions you set.

» Before you start your streaming, two key steps remain: Set the size of your output "streamed" video under the Output Size option—this is exactly what's going to be sent over to Ustream. Select the Bit Rate as well: So long as your setup can handle it, higher bit rates directly translate to a higher-quality final product.

» And finally, if you want your game's audio to be broadcast to Ustream, click the Device menu under the Audio portion of the app and select the option that's either Stereo Mix or What U Hear, depending on the specifics of your card. If neither exists, you can always select your standard microphone jack, hook up a headset, and provide some thrilling audio commentary... or foley.

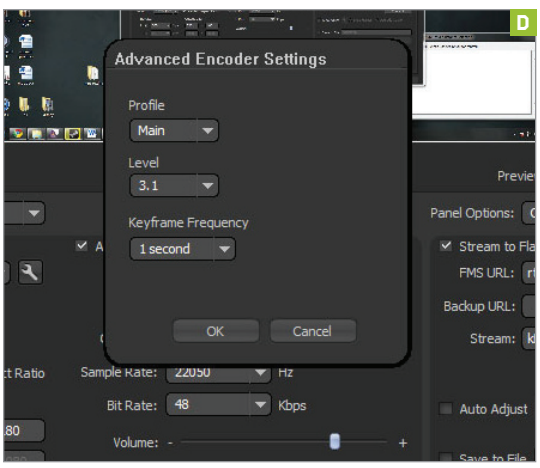
» Ready? Click the big green Start button.



4 BROADCAST TO USTREAM Head on back to Ustream and click the giant Go Live button in the upper-right corner. Once your official Broadcast Live window pops up, you'll notice that you can't really adjust settings like video quality or audio quality on the web app itself. That's because Ustream, in this instance, is merely the switch that turns your live broadcast on and off. All quality settings are being handled by Adobe Flash Media Live Encoder, which should already be running in the background as you read this.

» Click Start Broadcast to do just that **(image E)**, and then sit back and watch your rise to Internet superstardom begin. And do send us an autograph when you strike it big!

» Final caveats: You'll notice that we haven't dabbled too much in numerical specifics—what to set for your stream's bit rate, the size of the video itself, what your frame rate should be, etc. Sadly, the best numbers to slap in these fields can vary by a number of key factors, not the least of which is the speed of your computer and the speed of your Internet connection. The name of the streaming game is experimentation, and only you can ultimately determine the specific settings that work best for your configuration. We can show you how to stream; it's up to you to make it look good.



Track Your Stolen Laptop for Free

Using Prey, you'll have the upper hand over thieves –Alex Castle

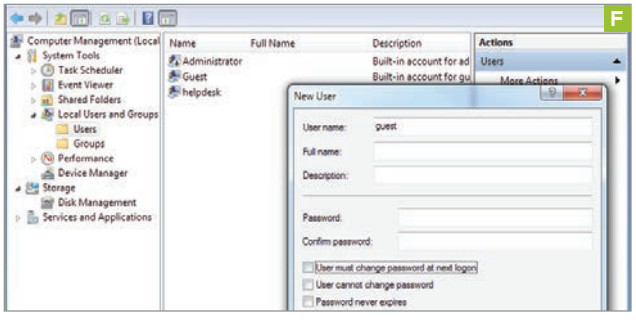
A LAPTOP IS A LOT OF THINGS—it's a mobile entertainment center, a portal to the web, and a way to get work done away from home. More than anything, though, it's a freakin'-expensive piece of hardware that you absolutely do not want to lose.

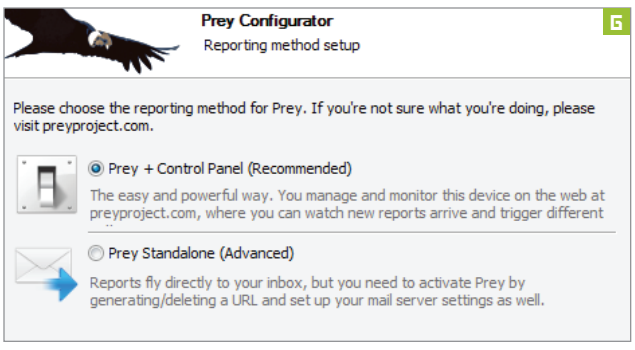
Of course, the best way to keep your laptop is to not get it stolen in the first place. But if you do, you can be prepared to try and track it down. Plenty of companies are more than happy to charge you a recurring fee for this sort of protection, but you can actually get it for free. A software package called Prey allows you to remotely monitor your stolen laptop, retrieving screenshots, webcam pictures, and Wi-Fi hotspot information that you (and the police) can use to track down your property. It's open source, it's free, and we'll show you how to use it.

1 MAKE A GUEST ACCOUNT IN WINDOWS In Windows, Prey runs as a service. Unfortunately, that means that its tracking abilities will only kick in when a thief logs into a user account on your computer. A truly sophisticated criminal would know to never do this, but we're looking to provide protection against your average thug, not Ethan Hunt.

» So the thug has to be able to log into an account. You've got two options: First, you could remove the password from your primary account (which for safety reasons should never be the administrative account). That leaves your data exposed, so we recommend the second option—creating a password-unprotected guest account.

» Creating a guest account is easy—just open the Start Menu, then right-click Computer and select Manage. In the Local Users and Groups tab you can right-click and create a new account **(image F)**.



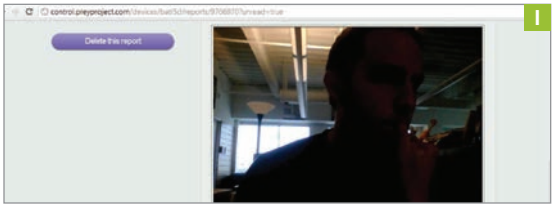


2 INSTALL PREY Now, log in to your new guest account, and download the Prey installer from www.preyproject.com. Run the installer, and when you get to the end, choose to configure Prey now. The first thing you'll need to decide is how you want to manage Prey **(image G)**. You can choose to use the online control panel, or to set it up in stand-alone mode. There are a few drawbacks to the online control panel (you can only store 10 reports at once online, for one), but we think the convenience outweighs any limitations. Select the control panel method and you'll be asked to create an account.

» The only other setting you may want to change locally is to tell your computer to automatically connect to in-range Wi-Fi hotspots. This may help Prey send you reports, even if the perp doesn't mean to connect to the Internet.

3 GET REPORTS The unthinkable has happened! Your laptop has been pilfered! (Or, you just want to test out Prey). It's time to log in to the control panel and have a look around. In the control panel at Preyproject.com, there are a number of reporting options you can set, but the most important is at the top, marked Missing. If your laptop is stolen, toggle this option as soon as possible to tell Prey to start sending reports. You can also increase the frequency of sent reports, but remember that the free version of Prey stores only 10 reports at a time, so if you're not going to be able to retrieve the reports over a few hours, you might want to set a longer interval. Beyond that, all the options are pretty straightforward—they allow you to keep track of networking and geolocation information **(image H)**, so you can find your laptop, and to track webcam activity and which programs the thief uses **(image I)**, so you can identify them to the police.

» So that's it—sit back, wait for the reports to start rolling in, and laugh maniacally.



BUILD IT

GEORGE JONES **EDITIOR IN CHIEF**

The Home Office Conversion

Is it possible to convert a standard home office into a surround sound home theater with minimal fuss?

LENGTH OF TIME: **08 HOURS** | LEVEL OF DIFFICULTY: **EASY**

INGREDIENTS

PART/URL	PRICE
Yamaha YSP-2200 Digital Sound Projector www.yamaha.com	$715
Epson PowerLite 8700UB www.epson.com	$2,345
Atdec TH-WH-PJ-FM Telehook Universal Projector Flush Mount www.atdec.com	$55
Elite Screens Manual 120-inch Pull Down Projection Screen, 16:9 aspect ratio www.elitescreens.com	$160
Ceton InfiniTV 4 Digital Cable Quad-Tuner card www.cetoncorp.com	$400
Warpia StreamHD Wireless PC to TV 1080P www.warpia.com	$140
Logitech Harmony 880 Advanced Universal Remote Control www.logitech.com	$60 (used)
Logitech diNovo Edge Bluetooth Keyboard www.logitech.com	$155
Razer Onza Tournament Edition www.razerzone.com	$50
GlideTV Navigator www.glidetv.com	$50
50x 60-inch vinyl pull-down shade www.lowes.com	$60
Cables: 2x 35-foot HDMI high-speed cables www.amazon.com	$54 each
TOTAL	$4,298

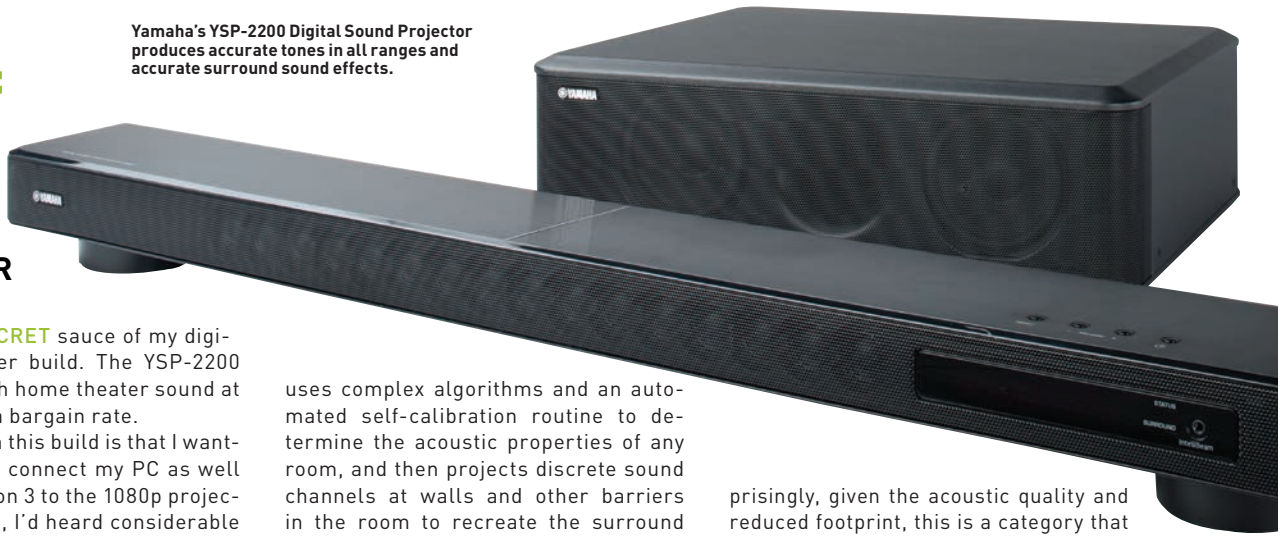
THE MISSION Because we're doing a step-by-step build of the $667 PC in this month's cover story, we decided to take a less traditional approach to this month's Build It section by detailing a home office conversion I attempted a few months ago.

I have an average-size spare bedroom that mostly functions as a home office and gaming room, and has been used primarily by me. Given the cramped quarters of San Francisco apartments, I set out to make the room less me-centric and more family-friendly by transforming this home office into a home office theater. The goal was to create a room suitable for three things: normal PC computing, big-screen surround sound movie viewing with no reconfiguration needed, and big-screen gaming. Ancillary goals were to make the room feel less like a cluttered man cave, and to avoid breaking the bank.

For the most part, I think I got this one right.

Component Spotlight

AUDIO:
YAMAHA YSP-2200 DIGITAL SOUND PROJECTOR



Yamaha's YSP-2200 Digital Sound Projector produces accurate tones in all ranges and accurate surround sound effects.

THIS IS THE SECRET sauce of my digital home theater build. The YSP-2200 delivers big, rich home theater sound at what feels like a bargain rate.

The trick with this build is that I wanted to be able to connect my PC as well as my PlayStation 3 to the 1080p projector. Prior to this, I'd heard considerable praise heaped on Yamaha's sound projector, and *Maximum Tech* editor Michael Brown recommended I check out Yamaha's YSP-2200. I'm glad I did.

The YSP-2200 consists of two parts: a 37.13x3x5.75-inch center unit and a 17.13x5.38x13.75-inch subwoofer. It uses complex algorithms and an automated self-calibration routine to determine the acoustic properties of any room, and then projects discrete sound channels at walls and other barriers in the room to recreate the surround sound experience. Frankly, the 5.1 and 7.1 modes really surprised me given the size, enough so that it's hard to imagine ever buying a space-consuming six- or seven-speaker set again.

It also supports HDMI 1.4a, making it 3D-compatible down the road. Not surprisingly, given the acoustic quality and reduced footprint, this is a category that is quickly gaining in popularity. We're starting to see more and more sound projectors on the market every year. It's worth noting that Yamaha makes both lower-end and higher-end sound projectors, as do a number of audio companies, including Boston Acoustics and Polk.

You can find cheaper 1080p projectors, but few deliver the sharpness, brightness, and image-throw versatility of Epson's 8700UB.

VIDEO:
EPSON 8700UB

SO MUCH FOR not breaking the bank. The moment we got our hands on Epson's 8700UB projector, we knew it was destined to be the visual centerpiece of this project. Truth be told, it's not that easy to find high-quality 1080p projectors that don't cost a fortune. The low-end of the price scale in this category includes Optoma's highly touted HD20 ($900 retail), and Epson's PowerLite 8350 ($1,100 retail).

The picture quality of the 8700UB is superb, and the 1,600 lumen output (which increases to 1,830 in Dynamic mode) allows it to function surprisingly well with some ambient light present.

I really love two of this projector's features. First, an adjustable 2.1:1 manual zoom lens allows you to throw a 110-inch diagonal image from variable distances ranging from 11 feet, 9 inches all the way to 25 feet, 1 inch. This allowed me to run a 120-inch image in my 15x13-foot room. Second, the projector allows you to shift the image position vertically and horizontally, which allowed for convenient installation in the corner of my room. (It's worth noting that using the zoom lens does reduce the brightness—Projector Central reports that this drop-off can range from 18 to 36 percent, depending on zoom level.

I spent a lot of time contemplating a wide variety of projection screens to go with the Epson projector. I drooled over a number of higher-end motorized screens, dreaming of push-button conversion to theater mode before settling on a simple manual screen with a 1.1 gain. It works great. (Gain indicates the reflectivity of any screen or projection surface. A 1.0 gain is considered normal. Most conventional screens have gains in the 1.0 to 1.3 range.)

Regardless of the lumens and the slightly reflective screen, I still found that the best condition for the greatest visual quality was darkness. With notions of weekend-long sessions of Portal 2 and Shogun 2 in mind, I purchased an inexpensive vinyl pull-down shade for the large window in this room. In an effort to keep my girlfriend happy, I installed the shade inside of the room's curtains. Success!

A recent software upgrade to Ceton's InfiniTV 4 allows you to stream live video anywhere in the house by splitting the add-in card's four tuners among networked PCs.

Other Important Components

IF YOU REMEMBER last year's 3D HTPC build ("Home Theater with a Vengeance," August 2010), you may recall that we used a number of interesting accessories. I transferred a few of the devices we used back then to work with this home theater.

The no-brainer of the batch was Ceton's InfiniTV 4. Its four-tuner capacity makes it a recording workhorse, and Ceton recently introduced the ability to split the four tuners among other Windows systems on a network, which makes for easy live streaming. We'll explain how to make this work below, but it's worth noting that you'll also need to get your hands on a multituner CableCARD from your cable provider if you want to use it.

Similarly, I found that Logitech's diNovo Bluetooth keyboard and Glide TV's remote control mouse granted me full range of Media Center controls and some basic gaming controls at a distance. Razer's Onza Tournament Edition controller rounds out my collection of input devices.

More and more, Warpia's StreamHD is becoming an essential part of my home theater. It's great because it allows my friends and family to quickly and easily run media (including music) from their laptops to the big screen and receiver. A USB dongle plugs into a laptop, which then wirelessly transmits up to a 1080p signal to the soundbar and then on to the projector. As I mentioned in my review of the StreamHD in our June issue, some compression artifacts are visible at the higher resolutions, but picture quality is surprisingly clean.

Key Steps in Home Office Conversion

1 REARRANGE THE ROOM

THE FIRST STEP in converting my office into a hybrid office theater was to rearrange the furniture, desk, and equipment. Oh, the equipment.

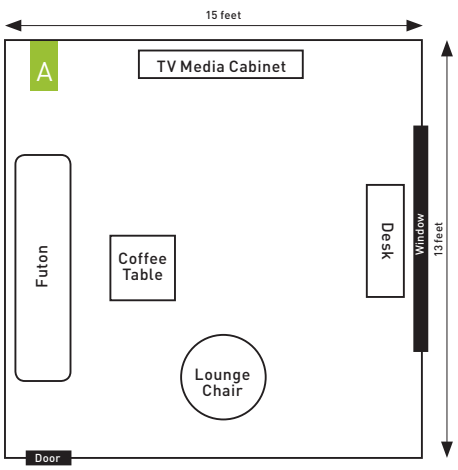
Prior to the conversion, I had a typical office setup, with a desk facing the window, and an old 36-inch CRT (hey, at least it was 1080p) and stereo system situated on a 7-foot-long wooden media cabinet (image A). Inside the cabinet was my cable box and PlayStation 3.

One of the goals of this project was to upgrade the CRT to a more impressive-looking (and larger) projection display more suitable for games and HD movies. My other goal was to be able to extend my PC's desktop onto a projected image for gaming, movies, videos, and more. Secondary goals were to ditch my cable box and enable PS3 action on the big screen.

The worst part about redesigning an office/theater room is that you have to spend a whole lot of time unplugging cables. After a few hours, the room was littered with about 45 different types of cables. I placed them all in a box and set them aside. With the hope that I'd never have to use them again, I removed the TV, cable box, speakers, and more from the room. I then set about shifting the furniture around to find the ideal arrangement.

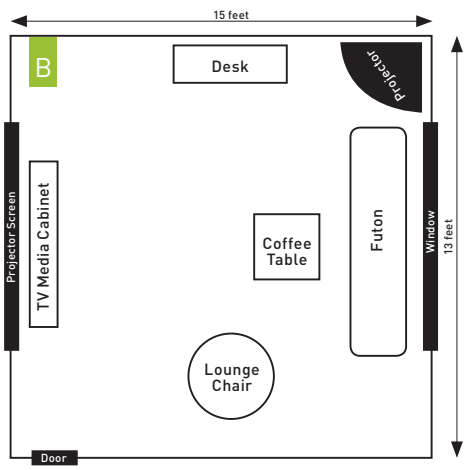
Ultimately, I discovered that the most effective configuration for watching media on the projector would be to use the longest dimension of the room for theater viewing. This allowed for a more theater-like feel, and it conveniently allowed me to place my computer in an ideal location on the far side of the room across from the door (image B).

Prior to rearranging the furniture, I measured the couch, desk, and media cabinet and made some sketches. However, after spending several half-days arranging and rearranging the furniture in this room, it became clear to me that the only way to find the optimum configuration is to explore as many possibilities as you can.



BEFORE

In terms of shape and size, this layout worked perfect as a makeshift office. However, the TV, cable box, and room layout make it inherently antisocial. The computer is essentially the center of the room, and the weird angles caused by the TV and couch aren't very inviting.



AFTER

After shifting the furniture around two times, I finally locked in on a format that allows the room to function as an office, home theater, and den. The window provides natural light for the room while working or lounging. And using the longest part of the room as the theater throw makes for a more cinematic experience.

2 MOUNT THE PROJECTOR

IN AN EFFORT to avoid having to hard mount my projector to the ceiling multiple times, I used a makeshift series of boxes situated in the corner of this room for a few weeks until I was absolutely certain the room configuration was right.

After examining a series of projector ceiling mounts, I took a chance on a mount a friend recommended: Atdec's flush-mounting telehook device. At $55, it's affordable, but also sturdy. Out of the box, it looks a little bit like a spider—this flexible design allows it to easily latch onto a number of projectors.

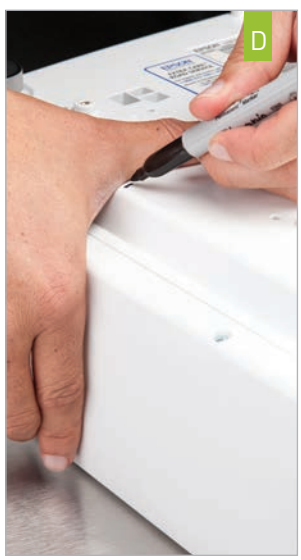
The first step in mounting the projector is to detach the ceiling/wall mount mechanism so that you can more easily attach the mount to the projector. This is easily accomplished using the included hex wrench (image C).

The next step is to determine the center of gravity for your projector. This is important because you want to make sure the projector is properly balanced when you attach it to the mount. You can do this by holding the projector with your hands, and sliding your fingers back and forth on the x and y axis until the projector feels balanced. Mark these axes with a pencil or pen (image D). The area where they intersect is where you're going to locate the center of the flush mount.

Now it's time to attach the mount to the projector. To do this, you'll need to place the projector mount in the center point, and then screw the appropriate-length mounting arms to the center mount. Once you do this, you can tighten up all the mounting arms, and you can then attach the entire mount to the screw holes on the projector (image E). Use the rubber standoffs to ensure a snug connection (image F).

You're pretty much done from here. All you have to do now is attach the ceiling/wall mount to your ceiling, which is easily accomplished, and then attach the projector mount to it. The whole process shouldn't take you more than 30 minutes.

C


D

E

F

3 RUN AND CONNECT CABLES

THE YSP-2200 has three HDMI inputs and one HDMI output as well as optical, S/PDIF, and analog audio inputs (image G). This allowed me the convenience of running all my video sources—PC, PS3, and Warpia StreamHD—directly to the soundbar. I could then run a single, long HDMI cable from the soundbar directly to the projector.

One quick note on HDMI cabling: If you're going to have a long run, like I do, from either your speakers to your projector, and/or from your PC to the projector, it's important to know the limitations. Typically, high-speed HDMI cables are capable of longer runs, up to 15 meters (almost 50 feet). They're also able to transmit 1080p and greater signals. Standard HDMI cables are not able to transmit signals over long distances, and top out at 1080i.

I also took advantage of this cable-reconnect job to organize my cables a little more effectively. I zip-tied the slack loops on my cables, and also clipped the long HDMI runs from my PC to the Yamaha YSP-2200 and from the YSP-2200 to the Epson projector.

Like many mid- to high-end receivers, Yamaha's YSP-2200 allows you to run all your video cables through the device to the display.

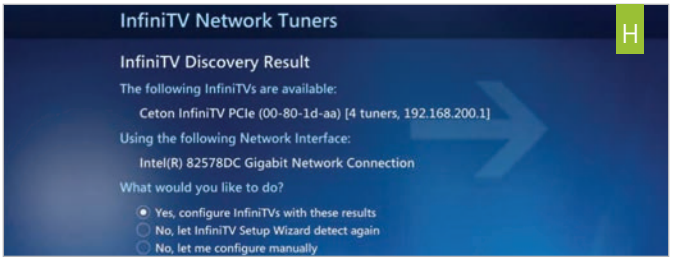
4 GET TV TUNER UP AND RUNNING

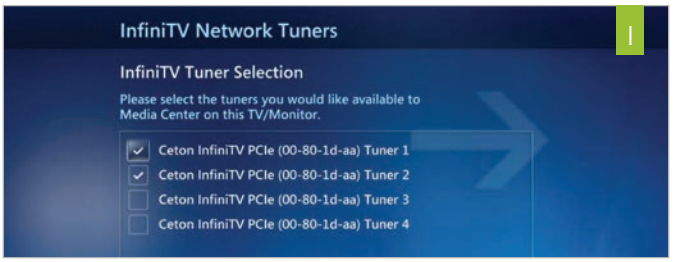
INSTALLING AND INITIALIZING the Ceton InfiniTV 4 tuner card was a snap. I plugged the device into my rig, plugged my CableCARD into the tuner, installed the drivers, and then initialized the card directly in Windows Media Center (image H).

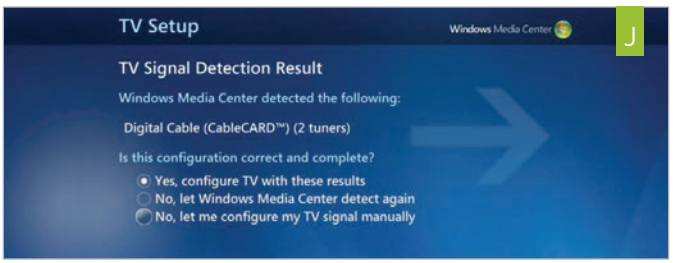
I chose to keep two of the card's four tuners assigned to my office PC, and I wanted to assign the other two available tuners to the computer connected to the big screen in my living room at the front of my house. This would effectively allow my household to record and watch TV shows in two different locations with only a single CableCARD device managing the content.

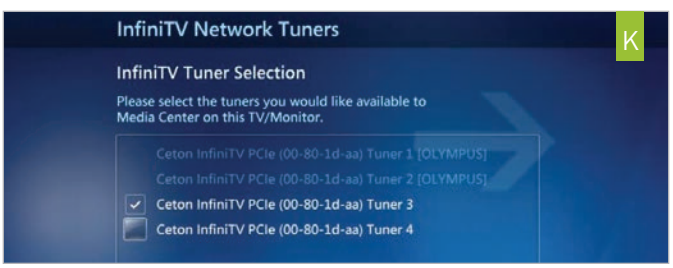
The process for accomplishing this was easy. Once Windows Media Center detected the four individual tuners the InfiniTV 4 card provided, I deselected tuners 3 and 4, leaving only tuners 1 and 2 available for my home office PC (image I).

Later, after I had completed the setup for the office, I used the InfiniTV Network Tuner setup on my living room PC. First, Windows Media Center detected the two available tuners (image J); it showed the two tuners already in use as grayed out. I quickly selected tuners 3 and 4 (image K), and was finished.









I was able to assign two of the InfiniTV's tuners to my office PC and two to other PCs on my network.

ASSESSING THE OUTCOME

BETWEEN REARRANGING the furniture and mounting the projector, this project took several weeks to complete, which makes the end result all the more satisfying. I now have a room that is able to function as a basic office, and with a few quick adjustments, I can quickly turn it into a full-on 1080p theater with surround sound and a 110-inch, 16:9 screen. The best part is that I can now play games and movies using my PC or the PlayStation 3.

The real surprise here is the YSP-2200. Holy cow, it's great, so much so that I am kind of kicking myself for buying a 5.1 system for my living room's sound system last year.

Also impressive is the Atdec projector mount. Being able to easily tuck my projector into the top corner of my office frees up lots of space and adds a professional touch that enhances the sense of being in a home theater.

If I had to do anything differently, I'd have used a rigid tension-mounted projector screen instead of a pull-down one. The non-tension pull-down screen works well, but the naturally curved surface produces some slightly distorted images. If I had used an $800 projector, this would be excusable, but a $2,200 projector demands a screen more appropriate for a higher-end home theater.

But in general, this project was a rousing success. The very best part is that I've just become a hero in the eyes of my girlfriend—who no longer has to wonder why two full-time professionals are dedicating an entire room solely to productivity—and my friends. Movie and game nights are way more fun now.

REVIEWS

TESTED. REVIEWED. VERDICTIZED.

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Puget Systems Serenity Mini

Is it on?

The Serenity Mini is the quietest performance machine we've ever tested.

AS ANY SYSTEM BUILDER KNOWS, there's a constant yin-and-yang balancing act between performance and noise. When you crank up the performance, you crank up the noise. And as you bring down the acoustics, so goes the performance.

That's the delicate line Puget Systems attempts to walk with its Serenity Mini desktop system. For this task, Puget configured the Serenity with a 3.3GHz Intel Core i5-2500K, an Asus P8H67-M EVO motherboard, 8GB of low-profile Kingston DDR3/1333, a Gelid Tranquillo cooler, two Intel 320 Series 80GB SATA 6Gb/s drives, a 2TB WD Caviar Green drive, and a PowerColor Radeon HD 5750 videocard.

All this is packed into an Antec Mini P180 case. The Antec P series is already tuned for acoustics, but Puget added some additional touches, such as AcoustiPack sheets in various spots, to make the case even quieter.

In performance, the Serenity Mini's numbers are fair. They're not benchmark chart-ripping scores, but they're not bad either. Much of that is thanks to the Core i5-2500K chip. Its stock speed is 3.3GHz but Puget overclocks it to 4.5GHz. This helps the 2500K overcome the overclocked Core i7-920 in our zero-point system in most of our application benchmarks. The Serenity Mini also does reasonably well against the similarly priced CyberPower LAN Party EVO (reviewed in July), which features a stock-clocked 3.4GHz Core i7-2600K. The CyberPower outpaces the overclocked Puget Systems in our Lightroom 2.6 test, but even with its Hyper-Threading, loses to the Serenity Mini in the rest of our benchmarks.

When we get to gaming, though, the CyberPower's GeForce GTX 580 shows who's in charge. It's simply a beatdown, putting a passively cooled card up against the fastest single-GPU card available.

But let's be honest, the Serenity Mini is not designed primarily as a gaming rig. Yes, a Radeon HD 5750 is certainly capable of some gaming duties at lower resolutions, say, 1680x1050, and even some games at 1920x1080, but it's not a card you'd pick if you're expecting to play Battlefield 3 on a 30-inch panel at 2560x1600. Instead, you want this GPU and this machine for its acoustics.

Is the Serenity Mini really that quiet? Yes. The rig is dead silent, which is more of a mind-bender than anything. You expect a system running at 4.5GHz to make some noise, but this is a black hole of silence.

We originally thought the CyberPower LAN Party EVO was quiet, but not in comparison to this. You move your head closer and closer to the machine in an effort to hear it, until your head is against the case. Even then, you can still barely hear anything. That's quite an achievement.

Puget really hit the mark in noise management, but there's still that vexing question: Would a gamer give up the performance? We're not totally sold on that point. If gaming was a factor in the machine's life, we'd pass on the Serenity Mini in favor of something with more graphical heft, such as the aforementioned LAN Party EVO, which, while not as silent, is fast and also quite small.

But if you're looking for a deadly quiet machine for your cave, and the primary purpose is either content creation or application use, we don't think you can get a more peaceful machine than the Serenity Mini. –GORDON MAH UNG

VERDICT 9

Puget Systems Serenity Mini

+ HUEY UH1 Unbelievably quiet; solid application performance.

– BABY HUEY GPU isn't the best for gamers; no Hyper-Threading.

$2,565, www.pugetsystems.com

BENCHMARKS

	ZERO POINT	
VEGAS PRO (SEC)	3,049	2,827
LIGHTROOM 2.6 (SEC)	356	357 (0%)
PROSHOW 4 (SEC)	1,112	839
REFERENCE 1.6 (SEC)	2,113	1,866
STALKER: CoP (FPS)	42.0	11.2 (-73%)
FAR CRY 2 (FPS)	114.4	38.3 (-67%)

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Our current desktop test bed consists of a quad-core 2.66GHz Core i7-920 overclocked to 3.5GHz, 6GB of Corsair DDR3/1333 overclocked to 1,750MHz, on a Gigabyte X58 motherboard. We are running an ATI Radeon HD 5970 graphics card, a 160GB Intel X25-M SSD, and the 64-bit version of Windows 7 Ultimate.

SPECIFICATIONS

PROCESSOR	3.3GHz Core i5-2500K (overclocked to 4.5GHz)
MOBO	Asus P8H67-M EVO Rev 3
RAM	8GB Kingston DDR3/1333
VIDEOCARD	PowerColor Radeon HD 5750
SOUNDCARD	Onboard
STORAGE	Two 80GB Intel 320 Series SSDs in RAID 0, WD 2TB Caviar Green
OPTICAL	Asus 12x Blu-ray Burner
CASE/PSU	Customized Antec Mini P180 / Seasonic X-560 watt

Asus Eee Pad Transformer TF101-A1

This Honeycomb tablet's a notebook in disguise

WITH OR WITHOUT THE OPTIONAL DOCK, the Eee Pad Transformer for Android Honeycomb delivers big time on the price/performance ratio. Its 1GHz dual-core Nvidia Tegra 2 processor, 1GB of RAM, 10.1-inch, 1280x800 screen, and 5MP camera with HD video recording match up with the more expensive Motorola Xoom, yet the 32GB Wi-Fi Eee Pad Transformer's price greatly undercuts the 32GB Wi-Fi/3G Xoom ($800, or $600 with a two-year data contract). The 16GB Eee Pad Transformer also beats the entry-level iPad 2 by 100 smackers.

Prices aside, the Eee Pad stands on its own as a strong tablet. At about a pound and a half and 0.47 inches thin, it feels especially good in your hands in portrait, while the extra width of the side speakers can throw off the grip a little if you're typing with your thumbs in landscape.

Comparing the Eee Pad's display to the Xoom's (which we already prefer over the iPad 2's display) we lined up the same high-def images side-by-side, and the Eee Pad clearly shows more-vibrant colors and an even greater degree of detail than the Xoom. Concerning touch response and graphics speed, the two Honeycomb tablets perform neck-and-neck, responding to gestures with little to no latency and providing smooth-flowing graphic refreshes. Still, the Eee Pad bested the Xoom in two of the three benchmark tests we ran.

Besides a few assorted basic apps, the Eee Pad preinstalls Polaris Office 3.0, a tablet-optimized app (not available in the Android Market) for viewing, editing, and creating standard Microsoft Office docs, spreadsheets, and presentation files.

We're leery of watered-down office suites, but Polaris gives us a viable way to do real work on a tablet. It pleasantly surprised us with the balance it strikes between functionality and ease of use. Polaris easily opened the MS Office .docx, .xlsx, and .pptx files we threw at it, as well as PDFs and older Word docs. It had problems opening older Excel formats and opened RTFs with unwanted formatting characters. You can open files from any location on the tablet, or download and open straight from Dropbox. It only saves files in the Office 2003 format.

An optional dock adds a keyboard/mouse, full-size SD card slot, 40-pin connector port for power, an auxiliary battery, and two USB ports with support for a USB mouse and external drives. We confirmed the estimated 16 total hours operating time from both tablet and dock batteries with our own tests, and would expect a bit less time under strenuous use.

The dock's keys don't have the best action, and the scrunched-together layout leads to some mistakes. Still, the keyboard makes typing much faster than on a touch screen, and we love the shortcut buttons for Home, Back, Menu, Settings, Google Search, Browser Launch, Wi-Fi On/Off, Bluetooth On/Off, media playback, and screenshots.

The touchpad mouse lets you do two-fingered scrolling and swiping, but does not include the two-fingered zoom in/out gesture. Tapping the mouse pad acts as a mouse click, which is nice when it works, but its response feels inconsistent. Also, apps occasionally crash when you remove the tablet from the dock.

Undoubtedly, the Eee Pad Transformer presents a formidable tablet option, and we even enjoyed its utility as a laptop hybrid using the dock. This kind of package will only become more attractive as more developers create and optimize existing apps for Honeycomb tablets. **–MARKKUS ROVITO**

VERDICT 9

Asus Eee Pad Transformer TF101-A1

+ OPTIMUS PRIME Best-looking tablet display; Polaris Office does a nice job with MS Office files; optional keyboard.

– MEGATRON Poor HD video recording; connection to powered USB port does not charge the batteries.

$400 (16GB), $500 (32GB), $150 for optional dock, www.asus.com

SPECIFICATIONS

	Asus Eee Pad Transformer	Motorola Xoom
OS	Android 3.0.1 Honeycomb	Android 3.1 Honeycomb
DISPLAY	10.1-inch, 1280x800 (16:10)	10.1-inch, 1280x800 (16:10)
PROCESSOR/RAM	1GHz Nvidia Tegra 2/1GB	1GHz Nvidia Tegra 2/1GB
STORAGE	16GB (TF101-A1), 32GB (TF101-B1)	32GB (upgradable to another 32GB via microSD card)
CAMERAS (F/R)	1.2MP/5MP	2MP/5MP
WEIGHT/DIMENSIONS	1.49 lbs / 10.67x6.89x0.47 inches	1.6 lbs / 9.8x6.6x0.5 inches
BROWSERMARK SCORE	89,745	93,241

Read our more detailed review at bit.ly/3QGs35.

In tablet mode, the Transformer is comfortable to use in portrait mode; in landscape, not so much.

An optional keyboard transforms the, umm, Transformer.

The Transformer offers performance at a good price.

Lenovo ThinkPad X1

This ultraportable isn't for sissies

Gorilla Glass protects the edge-to-edge screen on the X1 from suffering nicks and scratches.

LAST MONTH WE REVIEWED Samsung's Series 9 ultraportable notebook and found that, while it offered an exceedingly svelte and fashionable form factor, there was a performance trade-off to all that stylishness. Lenovo's 13-inch ThinkPad X1 represents a completely different approach to ultraportability.

We're not suggesting that the X1 eschews aesthetics. In fact, it takes the ThinkPad's classic matte-black look-and-feel and jazzes it up with a few cosmetic updates, such as an edge-to-edge glossy screen, an island keyboard, blue-LED keyboard backlighting, and angled edges. But still, the overall motif is no-nonsense. There's no mistaking that this is a business notebook.

The X1's build quality is all business, as well. The notebook might be just an inch thick, but it's no dainty flower. It weighs 3 pounds, 13.3 ounces without the power supply, and it feels solid, making Lenovo's claims of mil-spec compliance wholly believable. The edge-to-edge LCD screen is topped with Gorilla Glass, meant to withstand the rigors of regular use.

The X1's CPU is also pretty burly—for this class. The Core i5-2520M runs at a 2.5GHz base clock, with Turbo potential up to 3.2GHz. Not surprisingly, it handily trounced the 1.4GHz Core i5-2537M in Samsung's Series 9, by more than 90 percent in three out of four content-creation benchmarks. It gave the 2.13GHz Core i7-640LM in our zero-point notebook a pretty sound beating too, for that matter. The one anomaly was in Quake III, which is essentially a CPU test these days. Our only explanation for why the X1 performed 30 percent worse than our zero-point here is that it's hurt by its single-channel RAM. All 4GB are on one DIMM, and there isn't a slot for a second. We've found that, for the most part, the large caches in Core 2 and Core *i*x chips keeps memory bandwidth from being a problem, but certain things, such as the very old Quake III, are sensitive to it. The improved prowess of Sandy Bridge's graphics processor shined through in our Quake 4 benchmark.

We're happy to see that Lenovo didn't let space concerns keep it from equipping the X1 with a 2.5-inch hard dive—in this case, a 320GB, 7,200rpm model. This allows for cheaper and more capacious upgrade options than a 1.8-inch drive would. We're sorry, however, that there's no optical drive in the mix, particularly when thinner and lighter ultraportables have managed that feat.

The X1's battery life was strong in our tests. The notebook played a looped video file for three-and-a-half hours on power-saving mode before pooping out. We were even more impressed with how quickly the battery recharged—more than 80 percent in 30 minutes, thanks to Lenovo's Rapid-Charge technology.

Yes, the ThinkPad X1 is a serious machine for serious ultraportable computing, although its ultraportability is on the heftier side and its computing doesn't include optical duties. –KATHERINE STEVENSON

VERDICT 9

Lenovo ThinkPad X1

+ XLENT A durable, well-equipped, ultraportable powerhouse.

– EX-LAX Close to 4 pounds; no optical drive; single-channel RAM.

$1,400, www.lenovo.com

BENCHMARKS

	ZERO POINT	
PREMIERE PRO CS3 (SEC)	1,260	865
PHOTOSHOP CS3 (SEC)	183.6	114.6
PROSHOW PRODUCER (SEC)	1,533	1,078
MAINCONCEPT (SEC)	2,530	1,835
QUAKE III (FPS)	191.7	131.1 (-31.6%)
QUAKE 4 (FPS)	17	34.7
BATTERY LIFE (MIN)	240	309

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Our zero-point ultraportable is an HP EliteBook 2540p with a 2.13GHz Intel Core i7-640LM, 4GB of DDR3/1333 RAM, integrated graphics, a 250GB 5,400rpm hard drive, and Windows 7 Professional 64-bit.

SPECIFICATIONS

CPU	2.5GHz Intel Core i5-2520M
RAM	4GB DDR3/1333
CHIPSET	Intel QM67
DISPLAY	13.3 inch,1366x768 LCD
STORAGE	Hitachi 320GB HDD (7,200rpm)
CONNECTIVITY	HDMI, DisplayPort, Ethernet, USB 3.0, USB 2.0, eSATA/USB, headphone/mic, 4-in-1 card reader, Bluetooth, 802.11b/g/n, webcam
LAP / CARRY	3 lbs, 13.2 oz / 4 lbs, 11.7 oz

Palit GTX 560 2GB

Fast, silent, affordable

NVIDIA IS STEADILY FILLING the gaps in its product line. Late last year, it had the GTX 460 768MB and GTX 460 1GB cards. Then the latter was effectively replaced at the $250–$270 price point by the GTX 560 Ti. Now the company is delivering the GTX 560, which will be priced around $200–$220. Unlike the GTX 460 768MB cards, which offered just a 192-bit memory bus, the GTX 560 supports a 256-bit wide bus.

The Palit card is slightly unusual in supporting a 2GB frame buffer, but its specs are otherwise pretty stock. It's not factory overclocked, but given the tweaking and streamlining that are part of the improvements to the GF114 (560) over the GF104 (460), we expect some performance benefits. The GTX 560 does have eight fewer shader units than the GTX 560 Ti.

We tested the Palit card against the Asus Radeon HD 6870 DirectCU, which fits into a similar price point, as well as a pair of factory-overclocked Nvidia cards—the Asus GTX 460 TOP 1GB model and the MSI GTX 560 Ti Twin Frozr II card. The 560 Ti is more expensive than all the others and thus was included for reference only, not as a direct comparison.

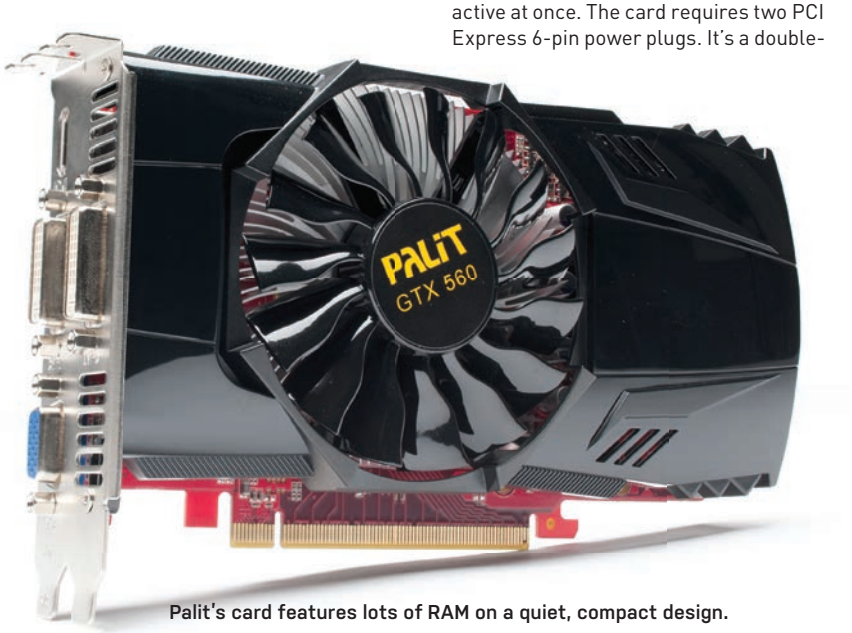
Palit spent some engineering effort in incorporating a slightly larger-than-normal 9cm, 15-blade fan design into the card. The entire affair runs 3dB quieter and 6 C degrees cooler than the reference design. The card includes two dual-link DVI ports, an HDMI connector, and an old-school VGA plug. It lacks a DisplayPort connector, though, and only two monitors can be active at once. The card requires two PCI Express 6-pin power plugs. It's a double-wide, full-height card, but is just 7.5 inches long, so it should fit in most PC cases.

The Palit GTX 560 card is a clear improvement over the GTX 460 1GB. It's likely that the 2GB frame buffer only has a minor impact; most of the improvements are due to the GTX 560's higher clock speeds and streamlining of the internal circuitry since the GTX 460. Most GTX 560 cards will likely ship with 1GB of GDDR5, but will be factory overclocked. With the Palit 2GB card you're trading off core clock speeds for additional frame buffer. Even without overclocking, though, Palit's GTX 560 2GB card is quite well equipped. **–LOYD CASE**

BENCHMARKS

	PALIT GTX 560 2GB	Asus Radeon HD 6870 DirectCU	Asus ENGTX-460 TOP 1GB	MSI N560GTX-Ti
3DMARK 2011	3,878	**4,314**	3,963	4,519
3DMARK VANTAGE PERF	16,811	**17,041**	16,226	19,482
UNIGINE HEAVEN 2.1 (FPS)	**22**	18	18	26
CRYSIS (FPS)	23	**29**	23	29
BATTLEFORGE DX11 (FPS)	**45**	42	40	54
FAR CRY 2 / LONG (FPS)	**87**	78	83	102
HAWX 2 DX11 (FPS)	**109**	77	101	127
STALKER: COP DX11 (FPS)	36	34	35	44
JUST CAUSE 2 (FPS)	**41**	35	35	42
ALIENS VS. PREDATOR (FPS)	**27**	**26**	21	32
F1 2010 (FPS)	45	**54**	43	52
METRO 2033 (FPS)	16	**20**	15	17
SYSTEM POWER @ IDLE (W)	120	**140**	133	130
SYSTEM POWER @ FULL THROTTLE (W)	**310**	252	298	305

Best scores are bolded. Our test bed is a 3.33GHz Core i7-975 Extreme Edition in an Asus P6X58D Premium motherboard with 6GB of DDR3/1333 and an 850TX Corsair PSU. The OS is 64-bit Windows 7 Ultimate. All games are run at 1920x1200 with 4x AA unless otherwise noted.



Palit's card features lots of RAM on a quiet, compact design.

VERDICT 9

Palit GTX 560 2GB

PALANTIR Compact, low power, and good performance for the price.

MAGIC 8-BALL 2GB frame buffer doesn't buy a lot of additional performance.

$200, www.palit.biz

Asus P8Z68-V Pro

New Z68 chipset makes big improvements over P67

WHEN IS A CHIPSET truly a new chipset? That's a question that many PC enthusiasts will ponder when they see the specs for Intel's Z68 chipset, which is at the heart of the Asus P8Z68-V Pro board.

For one thing, there's no native USB 3.0, no additional PCI-E lanes (which are tied to the CPU anyway), and still the paltry two SATA 6Gb/s ports that Intel included with the original P67 chipset's PCH chip. If these negatives are enough to make you skip the rest of this review, know that you're making a big mistake.

That's because the Z68 chipset in the P8Z68-V Pro offers several major advances over the P67: the ability to overclock the processor graphics in the Sandy Bridge CPU; Identity Protection Technology, which is essentially a hardware token integrated into the chipset and CPU; Smart Response Technology for SSD caching; and the ability to switch between the discrete and integrated graphics.

Of these four features, the biggest impact will come from the Smart Response Technology. SRT lets you use a relatively small, low-cost SSD to give your hard drive "SSD-like" performance. Intel actually claims around a 4x improvement with SRT over an HDD alone.

On the graphics side, the P8Z68-V Pro board bundles LucidLogix's Virtu software, which lets you "switch" graphics modes. There are two modes available in Virtu on the P8Z68-V Pro: i-mode and d-mode. I-mode lets you plug your monitor into the integrated graphics port on the board. Most of your chores will run off the processor graphics, but kick on a game and the discrete GPU takes over. It actually works, but i-mode doesn't support SLI. And the main reason to run it, power savings, isn't hugely material as the GPU doesn't actually turn off. You'll also have to wait for profiles from LucidLogix for new games support. Another weakness of the feature is lack of support for dual-link DVI, so you can rule out 30-inch, high-res panels. Most people, however, will use d-mode, which runs off the discrete GPU. This mode lets you access the Intel Quick Sync video encoding technology in the CPU. In our encoding tests, we found Quick Sync to run roughly 30 percent faster than the mighty GeForce GTX 580 when encoding video using CyberLink's MediaEspresso 6.5. Zow!

The board itself is a near replica of the P67-based P8P67 Pro board in layout, SATA ports, and slots. With the PCI-E and memory controller integrated into the CPU and the exact same PCH as the P67 chipset, performance between the P8P67 Pro or Deluxe and the P8Z68-V Pro is a wash. That is, until you factor in the SRT SSD caching, which is a big boost for folks who intend to primarily run a hard drive. If you look at the benchmark charts you can see the impact of SRT, which also felt faster in general use than a hard drive alone.

The best performance will always come from running the SSD as your primary disk, but then you are limited by size and are always managing your data between the SSD and HDD. With SRT, you have all the spatial freedom of a fast 3TB drive with much of the performance of an SSD. One thing to note: The Maximized mode gives you the best write performance, but you run the risk of data loss should your system lose power or blue-screen suddenly during a large write. Enhanced mode is safer, but your fastest write is at the speed of the hard drive.

So what do we think of the P8Z68-V Pro board? We probably would not upgrade to it if we were running a P67. We view SRT and the Quick Sync access as valuable, but not quite worth the hassle of an upgrade. But this board is the clear choice if you're building a new mainstream PC. **–GORDON MAH UNG**

VERDICT 9

Asus P8Z68-V Pro

+ THE LETTER G Beautiful UEFI interface; Intel SRT and Virtu support.

– THE LETTER A Documentation for SRT and Virtu support lacking; no dual-link DVI support on integrated graphics.

$210, www.asus.com

BENCHMARKS

PC MARK VANTAGE

SSD	N/A	20GB Intel 311	240GB OCZ Vertex 3	240GB OCZ Vertex 3
SRT MODE	Off	Maximized	Maximized	Enhanced
PCM VANTAGE 64	12,473	12,777	**20,024**	17,910
MEMORIES	9,570	9,887	**13,209**	12,047
TV AND MOVIES	6,914	6,544	**7,306**	6,963
GAMING	11,873	19,621	22,318	**22,520**
MUSIC	10,541	16,347	**21,790**	17,720
COMMUNICATIONS	13,468	17,784	**19,337**	17,620
PRODUCTIVITY	9,829	15,799	**23,828**	22,319
HDD	6,557	19,132	**35,703**	28,010

Best scores are bolded. We used a 3.4GHz Core i7-2600K CPU, Asus P8Z68-V Pro, 8GB of DDR3/1333, a GeForce GTX 580, 64-bit Windows 7 Professional with SP1, and a 1TB Western Digital Caviar Black drive for our testing.

BENCHMARKS

CRYSTALDISKMARK

SSD	N/A	20GB Intel Larsen Creek	240GB Vertex 3	240GB Vertex 3
SRT MODE	Off	Maximized	Maximized	Enhanced
SEQ. READ (MB/S)	135.3	165.3	**383.8**	378.9
512K READ (MB/S)	49.4	140.3	**370.5**	358.5
4K READ (MB/S)	0.7	22.5	28.3	**28.8**
SEQ. WRITE (MB/S)	134.3	121.3	**250.0**	130.0
512K WRITE (MB/S)	80.8	108.0	**218.6**	83.4
4K WRITE (MB/S)	1.3	34.7	**60.5**	1.3

Best scores are bolded. We used a 3.4GHz Core i7-2600K CPU, Asus P8Z68-V Pro, 8GB of DDR3/1333, a GeForce GTX 580, 64-bit Windows 7 Professional with SP1, and a 1TB Western Digital Caviar Black drive for our testing.

The integrated DVI port can be used in combination with your discrete card, but lacks dual-link DVI support.

The Intel Z68 chipset in the Asus P8Z68-V Pro brings SSD caching and virtual graphics to Sandy Bridge.

Developed by gamers, for gamers, we expected more from the BenQ XL2410T.

The Acer HN274H's performance is impressive, matching that of our zero-point machine nearly step for step.

3D Display Duel

Should you take the 3D plunge with your next desktop monitor?

A VARIETY OF MONITORS have come out recently touting 3D capabilities. But do they really stand up to full-size HDTVs? And, more importantly, are they sacrificing quality for 3D features? We got our eager hands on two recent offerings—BenQ's XL2410T and Acer's HN274H—to answer these questions.

Although the two displays overlap in many places (both run a 1920x1080 resolution and both, necessarily, refresh at 120Hz), they also have their own advantages and disadvantages. The Acer is bigger, at 27 inches, while the 24-inch BenQ has portrait-mode capabilities. The Acer is unique in having an embedded emitter, while the BenQ was developed "by gamers for gamers." Would the features even out in light of performance? Hours of No BS testing would tell. **–AMBER BOUMAN**

BENQ XL2410T

BenQ developed the XL2410T with the help of two high-profile Counter-Strike gamers in order to produce one of the first 120Hz, LED-backlit monitors that is 3D capable—although it doesn't come bundled with Nvidia's 3D Vision glasses and emitter. You'll need to buy that kit separately for $150. The TN panel has the advantage of being able to go to portrait mode—one of the few bonus features in this display.

During our testing, the XL2410T gave us decent detail and good color, however, anything white looked overly bright, creating halos; the display also produced some noticeable compression banding throughout the testing. The very dark gray levels were yet another issue—during our DisplayMate testing we lost detail in the darker images and during our video testing black did not appear as deep or rich as we would have liked. There was also evidence of some slight color-tracking errors, with evidence of faint greens and reds in the grayscale and some high-contrast streaking.

The XL2410T held steady during our Arkham Asylum tests; however, again, the black was a bit of an issue. Our 3D testing went well, producing a clear and solid experience.

Overall, the XL2410T did a fair job but didn't thrill us.

VERDICT **7**

BenQ XL2410T

$400, www.benq.com

ACER HN274H

Acer's HN274H, on the other hand, was remarkable. Not only is this 27-inch display the first to incorporate the 3D Vision IR emitter into the display itself, but it also has HDMI 1.4a—so it's capable of being used with a Blu-ray deck or PlayStation 3—and a WLED backlight. Exciting stuff, but it doesn't do much good if the display is a disappointment in 2D. Fortunately, in that regard the HN274H was stellar.

From start to finish, the TN-based HN274H kept pace with our zero-point monitor (an IPS-based Dell U2410), producing accurate—albeit slightly cooler—colors, incredible details, and texture. It aced nearly every test we put it through, save the dark-screen test, which revealed the slightest touch of lighter spots across the screen. In fact, the black level was our only complaint, and the only area in which the HN274H didn't mirror our zero-point, but instead produced a slightly grayer black. The HN274H also had a touch more moiré noise in test patterns, which kept us from awarding it a Kick Ass award.

In our 3D testing, the HN274H continued to perform admirably, utilizing its embedded emitter with little trouble to produce a crisp, quality 3D image. Overall, this is one sweet setup—if you've got the cash for it.

VERDICT **9**

Acer HN274H

$680, www.acer.com

DHK Storage PopDrive POP-500

A good idea hamstrung by complex software

If only the PopDrive's configuration software was as sleek as its aluminum chassis.

THE BASIC IDEA BEHIND THE POPDRIVE is a good one: a sleek, portable external enclosure that holds two 2.5-inch drives in RAID 1, to protect against the risk of data loss due to drive failure. Add in support for user notification emails, hotswap drive bays, and a relatively speedy 3Gb/s eSATA port, and it sounds like you've got yourself a winner. And you might, eventually.

The PopDrive includes a slim, aluminum dual-bay chassis, 5V AC adapter, and USB 2.0 and eSATA ports at the rear of the chassis. If the PopDrive's 1.2x3.9x6.4-inch aluminum chassis looks familiar, that's because it's the same casing as Silverstone's DS221 dual-bay RAID drive. Silverstone's device, though, uses a mechanical switch to change between RAID 0, RAID 1, and JBOD, while the PopDrive's configuration is all done via software. And what a joy that software is.

Just kidding. Configuring the PopDrive is a pain in the booty. First you install the included SiliconImage 57xx SteelVine volume management tool. Then you restart your computer, slot the two included 2.5-inch drives (two 500GB WD Scorpio Blue drives, in our review model) into the PopDrive, and connect it to your computer via USB 2.0 or eSATA.

At this point it's necessary to consult the 64-page user manual, as the SteelVine software isn't optimized or configured at all for the PopDrive. It gives many more options than the PopDrive actually supports, which you wouldn't know unless you've read the manual. Of the six configuration options—listed as JBOD, SAFE (RAID 1), BIG, SAFE33, SAFE50, and FAST (RAID 0)—the latter three are listed as "not recommended for the PopDrive" in the manual. From there, it's a simple matter of choosing RAID 1, saving the array configuration, applying the configuration, and then waiting a minute or so while the instructions percolate down to the device level and the software lets you know the array has begun to build. Then, for 10 or 12 hours, you play the waiting game.

Once the array is configured, you can create and format a partition in Disk Management and assign a drive letter; thereafter the drive appears as a single volume, which can be used normally. When connected over eSATA, the PopDrive showed sequential read and write speeds of 76MB/s and 65MB/s, respectively—a little slower than the raw disk speeds of the 2.5-inch 500WD Scorpio Blue 5,400rpm drives included with our PopDrive review unit, but certainly respectable.

The one advantage provided by the PopDrive's use of the SteelVine software is that software's ability to send email notifications upon critical events. This is useful for the hypothetical IT consultant who DHK told us is their ideal client—someone who sets up the PopDrive in a small business environment so they can rotate out drives for offsite backup. However, IT managers have many other speedier, easier-to-configure, and more robust backup systems at their disposal—NAS devices come to mind. For home users, the drive management software is much too complex.

To its credit, DHK claims that a simpler software interface for the PopDrive is forthcoming this summer. That can't come soon enough.

If DHK had waited to put its device on the market until a good software backend was in place, it would have scored higher. It also would have scored higher with a USB 3.0 interface instead of USB 2.0. Sure, eSATA is nice, but not everyone has an eSATA port, and using a USB 2.0 connection with this device removes the hotswap capability, drops the speed down to 30MB/s or so, and makes the disconnecting process much harder. As it is, the PopDrive's software is too complicated for home users and its hardware is too limited for most business users. Other eSATA RAID 1 bays aren't quite as slim and sleek, but are easier to configure, offer more storage space, and are more robust. **–NATHAN EDWARDS**

VERDICT **6**

DHK PopDrive POP-500

+ POP ROCKS Sleek, elegant, and portable design; RAID 1 support.

– POP PUNK Complicated and unoptimized software; base is not particularly stable.

$250, www.popdrive.com

Cisco's Linksys E4200 looks pretty, but we value function over form.

Netgear's WNDR4000 looks very much like the older WNDR3700; too bad it doesn't perform like it.

Wi-Fi Router Rhumba

Time to upgrade your network or stand pat?

WE HATE TO SAY IT, but if you're looking for a new high-end router, it probably makes more sense to wait than to buy either of these models. It seems manufacturers still haven't figured out the best way to deploy the new Wi-Fi chipsets that offer three spatial streams to deliver theoretical throughput of 450Mb/s. We've been down this road with other new wireless technologies, so we know it will pass. We only wish we could tell you when. **–MICHAEL BROWN**

CISCO LINKSYS E4200 DUAL-BAND 802.11N ROUTER

We weren't impressed with the last Linksys-branded router that passed through Maximum Lab North. The dual-band Linksys E3000 (in reality, a rebadged Linksys WRT610N) delivered humdrum performance and lacked a number of important features we expect to find in a high-end router. The E4200 fares better, but we're still scratching our heads over some of Linksys's decisions.

The first thing you'll notice about the E4200 is its minimalist industrial design. Plug in its inline power supply (no wall wart!) and you'll find that it's almost devoid of front-panel idiot lights: There are no LEDs to indicate an Internet connection, which of its radios are operating, or even which of its ports are in use. The only thing that glows on the front panel is Cisco's logo. There *are* port-activity LEDs on the back of the router, but even these can be turned off via the router's web interface.

We like that. In fact, we liked the entire low-profile design—at least until we tried to plug in our Ethernet cables. That's when we discovered that the top of the router's housing blocked the vinyl hoods covering our cables' RJ45 connectors. We had no problem fitting cables outfitted with bare connectors, but that's pretty lame. Also lame: providing a USB port that doesn't deliver enough power to spin up a 2.5-inch USB hard drive (we tested it with a 500GB Verbatim Clon drive). Oh well, at least the router supports NTSF drives (the E3000 didn't).

Linksys claims the E4200 is capable of a "maximum speed up to 300 + 450 Mbps." Translation: The E4200 supports two spatial streams (with 150Mb/s of bandwidth each) on its 2.4GHz radio, and three spatial streams (also with 150Mb/s of bandwidth each) on its 5GHz radio. But as we found with the E3000, the E4200 comes from the factory with both radios broadcasting the very same SSID. And while Cisco has made a number of important improvements to its Cisco Connect software (which can turn any USB thumb drive into a wireless client configuration tool), the utility *still* doesn't inform you which radio it's connecting the client to. Unlike the E3000, however, you can easily access the E4200's web interface and change the SSIDs, as well as other critical aspects of the router's configuration.

In addition to assigning discrete SSIDs to each radio, we also enabled channel bonding on the 2.4GHz radio (an admittedly neighbor-unfriendly move, but we wanted to see what it was capable of;

besides, we don't have any neighbors). Channel bonding on the 5GHz radio was enabled at the factory.

We used Trendnet's new TEW-684UB wireless client adapter to benchmark both the Linksys and Netgear routers. This is the first USB adapter to feature three transmit and three receive antennas. Without that third antenna, the client can receive only two spatial streams. As you can see from our benchmark charts, the E4200 trounced Netgear's WNDR4000 on both the 2.4- and 5GHz bands at almost every test location. Indeed, the router delivered the fastest performance at 5GHz of any router we've tested.

So why aren't we awarding the E4200 a higher score? Three reasons: We shouldn't have to jump through hoops to enable the router to perform at its best, the router should provide enough power to its USB port to support any 2.5-inch hard drive, and we shouldn't be limited to using hoodless Ethernet cables.

VERDICT **7**

Linksys E4200

$160 (street), www.cisco.com

NETGEAR WNDR4000

Netgear has developed a bad habit of branding its new routers with two different model numbers. Take the WNDR4000—or is it the N750? Both names are printed on the box, and the router itself is labeled "N750 Wireless Dual Band Gigabit Router WNDR4000."

Did someone sleep through Marketing 101, or is this a shameless ploy to mislead uneducated buyers as to the router's capabilities? We ask because Netgear's website proclaims "Up to 750 Mbps—maximum combined speed." The dual-band chipset inside the WNDR4000/N750, you see, delivers theoretical maximum throughput of 300Mb/s on the 2.4GHz band and 450Mb/s on the 5GHz band. Add 300 to 450 and you get—that's right—750! There's no way to bond the two bit-streams to *deliver* 750Mb/s of throughput, of course, but don't let that get in the way of a juicy brand name.

Bad branding decisions aren't the WNDR4000's only problem. This router beat our previous champion—Netgear's WNDR3700—on the 5GHz band at two locations, but it significantly underperformed on the 2.4GHz band. What's more, the Linksys E4200 absolutely crushed both of Netgear's routers in most of our test locations in both throughput and range and on *both* frequencies.

Physically, the WNDR4000 looks almost identical to the aging WNDR3700. The front has the usual status LEDs, and you'll find a ubiquitous four-port gigabit switch, a USB 2.0 port, and a power switch in back. Unlike the Linksys, the Netgear had no problem powering our hard drive so that we could share its contents on the network. But like the Linksys, you can't use this port to share a printer on the network. Netgear hasn't made any significant changes to its browser-based user interface either.

The router arrived with channel bonding on its 2.4GHz radio disabled. We turned it on for our benchmarks, but Trendnet's TEW-684UB wireless client adapter indicated a link speed of just 145Mb/s. When we contacted Netgear about this, the company suggested that interference from a nearby wireless network might be forcing the router to turn off channel bonding on its own (this is a requirement for gaining Wi-Fi Alliance certification); but as we mentioned earlier, our test environment is devoid of other wireless networks. Besides that, neither the WNDR3700 nor the Linksys router had a problem.

Maybe a firmware update will fix what ails the WNDR4000 (we used version 1.0.0.64). Until that happens, there's very little to recommend this router over the older WNDR3700.

VERDICT **6**

Netgear WNDR4000

$150 (street), www.netgear.com

BENCHMARKS

	2.4GHz Band			5GHz Band		
	Linksys E4200	Netgear WNDR4000	Netgear WNDR3700	Linksys E4200	Netgear WNDR4000	Netgear WNDR3700
BEDROOM 1, 10 FEET (MB/S)	113.0	85.3	**143.0**	152.0	108.0	**154.0**
KITCHEN, 20 FEET (MB/S)	117.0	89.9	**135.0**	**126.0**	83.4	100.0
PATIO, 38 FEET (MB/S)	**108.0**	53.8	39.6	**90.8**	60.5	51.8
BEDROOM 2, 60 FEET (MB/S)	**84.2**	39.5	41.5	**54.4**	49.5	37.4
HOME THEATER, 35 FEET (MB/S)	**64.5**	25.5	35.4	**26.7**	6.3	17.6
OUTDOORS, 85 FEET (MB/S)	**24.9**	4.6	3.2	**3.2**	N/C	N/C

Best scores are bolded. TCP throughput measured using JPerf. N/C indicates no connection at that location. Additional benchmarking methodology at bit.ly/ajskdh.

SPECIFICATIONS: LINKSYS E4200

RADIO FREQUENCIES	Concurrent dual-band: 2.4- and 5GHz
TRANSMIT/RECEIVE ANTENNAS	3x3 (note: delivers three spatial streams on the 5GHz radio only)
GUEST NETWORK	Yes, but on the 2.4GHz radio only
IPV6 SUPPORT	No
DLNA-COMPLIANT MEDIA SERVER	No (UPnP only)
USB PORTS	One (for storage only)
NTFS DRIVE SUPPORT	Yes
WDS BRIDGE/REPEATER SUPPORT	No

SPECIFICATIONS: NETGEAR WNDR4000

RADIO FREQUENCIES	Concurrent dual-band: 2.4- and 5GHz
TRANSMIT/RECEIVE ANTENNAS	3x3 (note: delivers three spatial streams on the 5GHz radio only)
GUEST NETWORK	Yes, on both radios
IPV6 SUPPORT	Yes
DLNA-COMPLIANT MEDIA SERVER	Yes
USB PORTS	One (for storage only)
NTFS DRIVE SUPPORT	Yes
WDS BRIDGE/REPEATER SUPPORT	Yes

Thermaltake Shock One Gaming Headset

A solid all-rounder from a newcomer to the field

IT SEEMS LIKE THESE DAYS it's just not enough to master the case-heatsink-PSU trifecta of PC parts. In the past couple years we've seen Corsair, Cooler Master, and now Thermaltake diversifying their hardware portfolios with gaming mice, keyboards, and headsets. The Thermaltake Shock One is the flagship of the new Tt eSports line of gaming headsets, and we got a chance to take it for a spin.

The Shock One is, first and foremost, a well-built headset. None of the materials—from the plastic mesh on the earcups to the cushy faux-leather padding to the metal-reinforced headband—feel cheap, and the whole set has a substantial heft to it. It looks nice, too, with glowing insignias on the sides, and slick, black and red plastic across the front and top. Heavy-duty hinges above each earcup allow the entire set to fold up, for easy storage.

The set doesn't fall short in comfort, either. The earcups are sort of an unusual trapezoid shape, but they're big and well-padded and comfortable for long gaming sessions. The whole thing is a bit on the large side—great for those of us gifted with ample craniums, but maybe not the right pick for people on the lower end of the head-size spectrum.

The Shock One is a USB headset, and offers simulated 5.1 DTS surround sound. It's ready to plug-and-play out of the box, but installing the included software gives you control over the headset's simulated environments, equalizer, and surround sound settings. In terms of directionality, the DTS Virtual 5.1 beats the pants off of any analog headset, but falls a bit short of the Corsair HS1, which is comparable in price and uses Dolby Digital technology.

The set's 40mm drivers are, in a word, capable. The sound isn't going to blow you away, but the bass response, mids, and highs are all perfectly serviceable, and you won't be left wanting while playing games, listening to music, or watching movies. One gaffe: The Shock One's leatherette ear cushions absorb some of the sound, leaving the set sounding a bit muddy. Replacement fabric cushions are included in the box, and sound substantially better, but leave us in the unfortunate position of choosing between quality sound and superior comfort. **–ALEX CASTLE**

VERDICT

8

Thermaltake Shock One Gaming Headset

+ELECTRO Solid construction; good all-around sound quality; comfortable leatherette earcups.

–MYSTERIO Leatherette cups hamper sound quality; set may be too large for some.

$95, www.thermaltake.com

The Shock One is better suited to folks with bigger noggins.

The Witcher 2: Assassins of Kings

Choose wisely

Geralt after realizing that he kind of wants an iPad.

"INCREDIBLE." "HORRENDOUS." "Wow. I can't believe that just happened!" "Ugh, I can't believe that just happened." "Geralt, you cheeky bastard." "Geralt, you worthless bastard." These are all things we said while playing The Witcher 2. It's an incredibly hot-and-cold game, to be sure. One moment it might wow you with brilliant writing, or a choice that makes BioWare's fantasy behemoth Dragon Age look utterly toothless. The next it'll have you spitting flames over frustrating, repetitive combat, and design decisions that simply boggle the mind. Ignore all that, though, because here's what really counts: We couldn't put it down.

Witcher 2 picks up shortly after its predecessor, but manages to weave a separate, largely understandable tale—even for those who never touched the first game. And storytelling is where Witcher 2 is at its best. Geralt and his companions are a refreshing departure from the archetypal steroid-scarfing princess-rescuer or boy whose hometown exploded/imploded/crumbled under the pressure of a light breeze. Ultimately, you are the real star of the show and make no mistake: This is a game where your choices *really* matter. Geralt may carry two swords, but his tongue's sharper than both. In other games, picking a side might mean a few new dialogue options or a magical pair of shoes. In Witcher 2, it means absolutely *everything*: who you meet, what you do, what you stand for, where you go.

Speaking of "where you go," the game's world is completely breathtaking. Each location feels like a labor of love—alive, breathing, and brilliantly natural aside from the occasional NPC in dire need of a swift sock in the gut from the Fonz. Beyond that, however, the game marries a bleeding-edge engine to lush, epic art design, and they absolutely live happily ever after.

Unfortunately, when it comes to actually being, you know, *a game*, Witcher 2 slips on a puddle of its own ambition and occasionally falls flat on its face. Combat ranges from mediocre to downright infuriating—with the latter oddly occurring mostly at the start of the game. Geralt starts off perplexingly weak, you see, and copious double-damage-dealing backstabs often put him down for the count in the blink of an eye. On top of that, the game's a terrible teacher, essentially hacking off your wings and then flinging you out of the nest. Even after you grow some thicker skin and find an online Witcher 101 course, targeting is still a mess, uninterruptible animations abound, and surgical strategy quickly gives way to brainless hacking.

That's not to say it's all bad. The emphasis on pre-fight potion-popping, trap-setting, and weapon choices, especially, could have been amazing if encounters were better designed to take advantage of them.

Beyond that, a few termite-size issues threaten to sink the whole ship. Quest design is often cryptic and confusing, inventory management is a pain, and the ending rushes by like it's late for afternoon tea with its awful mother. We said "threaten," however, because that's all the game's issues ever do. Witcher 2's highs are still miles above its lows, oftentimes rendering them distant memories in mere seconds.

The game, then, is an oddity. For significant chunks of time, we simply weren't having fun. Without a doubt, however, the experience will stick with us for years. As a whole, we didn't just like it; we loved it—jagged, disfiguring scars and all. Confused? Just play it and see what we mean. You won't regret it. **–NATHAN GRAYSON**

He's probably just napping.

VERDICT 8

The Witcher 2: Assassins of Kings

+ SWORDS 'N' SORCERY Incredibly beautiful, detailed world; choices that really matter; mostly excellent writing and characters.

– GUNS N' ROSES Half-baked, sometimes frustrating combat; terrible tutorial; wonky interface and quest design.

$49, www.en.thewitcher.com, ESRB: M

LAB NOTES

ALAN FACKLER **ONLINE ASSOCIATE EDITOR**

Buried in Cases

Emerging from the Lab after days of case testing. What day/time is it?

TO SAY THAT THIS MONTH'S CASE FEATURE took a while would be a massive understatement. Nathan and I spent about a week in the Lab, for hours on end, building into every single one of the cases you read about, thermal testing each one using new-and-improved methods, and developing new and more-thorough benchmarking tools. You could say it served as my rite of passage, as Nathan Edwards has been officially relieved of case duty and is moving on to the crazy-competitive world of GPUs. But fear not, as I am proud to report that I was taught by one of the best in the business, and have built into some of the best (and worst) in the business, as well. Moving forward, I vow to abide by the strict and merciless tests, benchmarks, and overall values instilled in every verdict we grant. (I also accept the obligatory back problems that I've already begun to develop from hours spent hunching over cases with a screwdriver. Ow.)

Gordon Mah Ung
Senior Editor

Having successfully built a pretty decent Sandy Bridge box with intermediate gaming capabilities for $667, I'm wondering if I can seriously cut the price, to $400 or even $300. I think I could do it with an AMD E-350 Fusion, but performance wouldn't be tops. If AMD's new A-series APU is cheap enough, we could have a very compelling ultra-budget box.

Amber Bouman
Online Features Editor

I've been working my way through a ton of displays for review—I just finished with a BenQ and Acer, both 3D-capable. Next up are models by AOC and LG, the NEC PA301W, and hopefully a Dell U3011. If anyone sees another slick display that I should check out, let me know!

George Jones
Editor in Chief

After testing Yamaha's YSP-2200 digital sound projector, I feel like I just travelled forward in time. The fact that Yamaha is able to create deep bass, accurate high- and mid-tones, and full surround sound with a 3-inch high soundbar is remarkable. Suddenly, 7.1 speaker sets feel so overbuilt.

Alex Castle
Online Managing Editor

This month saw a huge number of high-profile PC game releases, including the likes of Brink, The Witcher 2, and Fable III. Do you want to know how many I played? Zero. Instead, I started playing Fallout: New Vegas for the first time. And poof, just like that, all my free time disappeared.

Nathan Edwards
Senior Associate Editor

I love testing cases. But after the eight-case roundup Alan and I just did, I'm happy to focus on other things for a while. Alan will be taking over cases for the most part, and they'll be in good hands. In the meantime, I'm hoarding games to play this fall. The only game I can play for the next few months is Wedding Planning.

LETTERS

WE TACKLE TOUGH READER QUESTIONS ON...

> Commodore 128
> RAM Configurations
> Browser Wars

Commodore 128 FAIL? I Think Not

I take deep offense to your inclusion of the Commodore 128 in your "10 Biggest PC Failures" list in the June issue. The first computer I bought was a 128 in 1986. It had built-in color, 128KB RAM, (64KB in 64 mode), built-in sound, and you could use a TV for a monitor. I bought a 1541 drive and a 1571 (with burst mode) for half of what an Amiga, PC, or Mac cost. It had tons of videogames available in 64 mode. And it sold very well outside the United States. Although CP/M mode was useless, it was essentially two great computers in one.

–Louis J Bang

EDITOR IN CHIEF GEORGE JONES RESPONDS: We have much love for the Commodore here at *Maximum PC*, but that useless CP/M mode is why we placed the C128 on the list. Well, that and the fact that it sold only 4 million units in four years' time, with many of those sales occurring in Europe.

Home Theater Cooling?

I recently built the Ultimate 3D HTPC from the August 2010 issue ("Home Theater with a Vengeance"). I noticed that you said you cooled the Silverstone Nightjar ST40NF case with the Grandia GD05's three 12cm fans. However, there is only one place to plug a fan in on MSI's 890GX motherboard. Could you please tell me how this was achieved?

–Luke Layman

SENIOR EDITOR GORDON MAH UNG RESPONDS: It's been some time since we built that machine, but as I recall, we ended up using a couple of $2 4-pin Molex–to–3-pin fan cables available from Tiger Direct (bit.ly/itT9D7). If you want some control over the fan speeds, adding a Zalman fan controller (bit.ly/79ajsa) will let you dial down the speeds. You should definitely run all three fans, however, as you will need some air moving over the PSU and CPU heatsink fan to keep them cool.

RAM Performance Delta Caused by Configuration?

I was recently doing a comparison of identically configured systems using PassMark. I noticed that some systems would blow away others with the same amount of RAM in memory performance. I can only assume that this is because of dual-channel architecture. I am wondering if there is a performance difference between using one 8GB stick of DDR3, two 4GB sticks, or four 2GB sticks. Can you confirm this and explain why this might be the case?

–Diedrich Guenther

SENIOR EDITOR GORDON MAH UNG RESPONDS: There would indeed be a difference in memory bandwidth with those various configurations. Assuming you are talking about a dual-channel LGA1155 Sandy Bridge board or a LGA1156 Lynnfield box, a single 8GB DDR3 DIMM would put you in single-channel mode and give your machine the least amount of memory bandwidth. One thing you should know: I have not seen any 8GB DDR3 modules that are not registered DIMMS. Since the LGA1155 and LGA1156 do not support registered DIMMs, you don't really have that option today.

As far as two 4GB DIMMs versus four 2GB DIMMs, both configurations would yield dual-channel RAM support. Which would be faster? It's a complicated question that depends on the modules being used, but I'd put my money on the two 4GB DIMMs having a very slight edge in memory bandwidth. Here's the thing: With the large caches and advanced algorithms used by today's CPUs, you are unlikely to see that difference pay off, especially at stock speeds. Where you will see a big difference from chasing memory bandwidth, is in systems with integrated graphics, where bandwidth will have a huge impact on graphics performance.

Browser War Bumble?

In the conclusion to your "Browser Brawl" (June 2011), the author, Paul Lilly, makes the statement, "Firefox still gets our nod as the best of the best." Of the five browsers listed, I use all of them except Safari. I decided to check that statement. Using performance figures on page 48 and applying a value of 1 for the best, ranging up to 5 for the worst, I found a tie between Chrome 10 and Internet Explorer 9 (28 points), followed by Opera 11 in third (30.5 points), Firefox 4 (31 points), and Safari bringing up the rear with 46.5 points).

In light of these rankings,

↘ submit your questions to: comments@maximumpc.com

can you please explain why Firefox received the nod as the best browser? The numbers don't lie!

–William Brown

CONTRIBUTING WRITER PAUL LILLY RESPONDS: Chrome posted the highest scores in Peacekeeper, Google V8, Celtic Kane JSBenchmark, and Mozilla Dromaeo. These are all JavaScript-specific benchmarks, and the reason we ran so many was to get a clear picture of which browser is truly the best at JavaScript. It's pretty much a given that Chrome is going to win Google's own V8 benchmark, but because it won several of the others, we feel confident in saying Chrome handles JavaScript code better than the other browsers. Firefox handily bested Chrome in HTML5 performance (GUIMark), and it enables hardware acceleration by default. Even when we enabled hardware acceleration in Chrome, it still didn't keep up with Firefox.

So to sum up the performance side, Chrome is faster in JavaScript, Firefox is faster in HTML5, and Firefox is faster in hardware-accelerated tasks. With all other things being nearly equal, the advantage goes to Firefox, but as we pointed out, "it's not a runaway victory." As for Internet Explorer, the extensions library is still woefully behind both Firefox and Chrome, knocking it out of contention as the best browser.

Where to Find Four 8GB Stick Kits?

I have a bit of a conundrum. I am looking to build a new computer this summer with the Core i7-2600K as the centerpiece. All the boards I am looking at have four RAM slots and support 32GB of RAM. Because I will be using Premiere Pro and After Effects, I want to load the RAM to the max. The problem is that it is impossible to find 32GB kits that have four sticks. A local shop was selling Patriot Viper II RAM that came in a 3x 8GB kit, but did not sell single 8GB sticks. Online searches did not turn up anything. So where, oh where can I get a kit of four 8GB sticks when it comes time to build?

–Brian Di Cesare

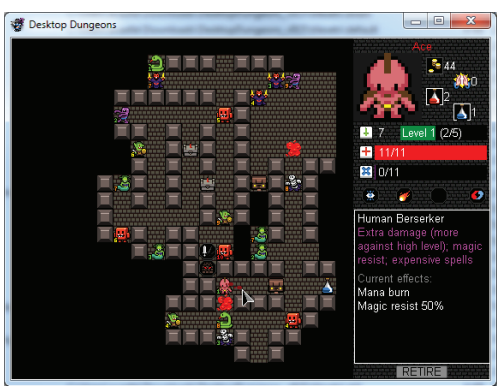
SENIOR EDITOR GORDON MAH UNG RESPONDS: I have not seen 8GB memory modules that do not support ECC. The only 8GB modules I've seen are ECC or FB-DIMM. Since Sandy Bridge CPUs do not support ECC, you're kind of out of luck until someone introduces 8GB DIMMs without ECC. For you, 16GB is probably as far as you can go today.

[NOW ONLINE]

TINY TIMEKILLERS: 21 FANTASTIC GAMES UNDER 5MB

Modern games don't leave much to the imagination. Sophisticated graphics engines, powerhouse PC hardware, and enormous production costs have created games with a level of fidelity we couldn't have even imagined just 10 years ago. It's a great time to be a gamer.

Still, with all the focus on production values, it's easy to forget about what matters the most: gameplay. To help remind everyone that gaming greatness is more than skin deep, we've rounded up 21 games that pack a ton of great gameplay into a tiny package. bit.ly/5games



[NEXT MONTH]

COMING IN MAXIMUM PC's LAMBORGHINI YELLOW SEPTEMBER ISSUE

The Dream Machine

It's time for our annual indulgence in outrageous performance, state-of-the art components, and cutting-edge assembly. We're going to envelope it all with an awesome custom paint job. You'll have to read the September issue to find out the rest.

ARM and the Desktop PC

The frenzy around ARM's CPU architecture and the slew of devices incorporating it got us wondering: What are the greater implications of this mass migration for traditional PC computing? We're going to take a deep, long look next month.

Geek Quiz

Think you're geek smart? Think again. As you sit back content in your geek credibility, we're devising a list of questions so extraordinarily challenging, you might just feel like you've been busted back down to n00b status. Sorry. (Not really.)

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HARDWARE

LGA1155 MOTHERBOARD

ASUS P8Z68-V PRO

While not a huge jump forward, we think Intel's new Z68 has enough features that folks building new rigs should opt for it over P67. Asus P8Z68-V Pro gives you access to LucidLogix Virtu as well as Intel's Smart Response Technology, and also features Bluetooth. And you still get Asus's lovely UEFI interface and out-of-the-box SLI and CrossFire support. It's even a bargain, at $209. www.asus.com

THE REST OF THE BEST

High-End Processor
Intel 3.46GHz Core i7-990X
www.intel.com

Midrange Processor
Intel 3.4GHz Core i7-2600K
www.intel.com

Budget Processor
Intel 3.3GHz Core i5-2500K
www.intel.com

LGA1366 Motherboard
Asus Rampage III Extreme
www.asus.com

AM3 Motherboard
MSI 890FXA-GD70
www.msi.com

Price-No-Object GPU
Asus GeForce GTX 590
www.asus.com

Performance GPU
XFX Radeon HD 6970
www.xfxforce.com

Midrange GPU
MSI NGTX560 Ti Twin Frozr OC
www.msi.com

Budget GPU
XFX Radeon HD 6850
www.xfxforce.com

Performance Hard Drive
OCZ Vertex 3 240GB
www.ocz.com

Capacity Hard Drive
Hitachi Deskstar 7K3000 3TB
www.hitachigst.com

Air Cooling
Cooler Master Hyper 212+
www.coolermaster.com

High-End Cooler
Prolimatech Armageddon
www.prolimatech.com

Blu-ray Drive
Plextor B940SA
www.plextor.com

Full-Tower Case
Corsair 800D
www.corsair.com

Mid-Tower Case
NZXT Phantom
www.nzxt.com

Speakers
Corsair SP2500
www.corsair.com

For even more Best of the Best entries, such as more speakers and budget components, go to www.maximumpc.com/best-of-the-best.

GAMES WE ARE PLAYING

The Witcher 2
www.en.thewitcher.com

Mount & Blade: With Fire & Sword
www.taleworlds.com

Portal 2
www.thinkwithportals.com

Brink
www.brinkthegame.com

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